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Research ¹³⁴ In Agriculture



ANNUAL REPORT, 1948-49
CULTURAL EXPERIMENT STATION
W. G. TAGGART, DIRECTOR

LOUISIANA STATE UNIVERSITY
AND
AGRICULTURAL AND MECHANICAL COLLEGE

Research in Agriculture

1948 - 49



ANNUAL REPORT



AGRICULTURAL EXPERIMENT STATION

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



Compiled by I. L. Forbes from Reports of Heads of

Departments and Project Leaders

Year Ended June 30, 1949

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Letter of Transmittal

Baton Rouge, Louisiana

April 1, 1950

GOVERNOR EARL K. LONG

BATON ROUGE, LOUISIANA

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1949, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, Director

Louisiana Agricultural
Experiment Station

506266

The Cover . . .

One of the most important developments in the agriculture of Louisiana in recent years has been the establishment of improved pastures to provide better grazing for the state's expanding livestock industry. Pasture experiments at the main station, at various substations, and on individual farms in many sections of the state have developed valuable information on such problems as the most profitable combinations of grasses and legumes, rates of seeding, fertilizer treatments, soil preparation, methods of handling and other management practices.

A striking example of the results being obtained in providing winter grazing for beef cattle is shown in the cover picture taken Feb. 25, 1950, by A. V. Patterson of the Louisiana Agricultural Extension Service. The cows in the picture are grazing on a pasture of second year Alta fescue grass and Louisiana White clover established at the West Louisiana Experiment Station at DeRidder on cutover pine-land that is typical of thousands of acres in that area. In establishing this pasture the land was cleared of stumps, shrubs and trees, native grass was plowed under, and one ton of lime, 500 pounds of basic slag and 500 pounds of 8-8-8 fertilizer applied in the fall of 1948. The fertilizer was disced into the soil and the land dragged smooth. Eight pounds of White clover seed and 17½ pounds of Alta fescue were sown and rolled in with a cultipacker. The pasture was reserved for seed production the first year (1949). In August 1949, 500 pounds of 8-8-8 fertilizer per acre was applied on the surface.

For additional information on pasture experiments, see special sections in reports from Crops and Soils, Animal Industry, and Substations.

Agricultural Chemistry and Biochemistry

Human Nutrition Studies in Progress

As has been mentioned previously in the Annual Report, one objective of this Department is to study problems applying directly to human nutrition. Currently, financial assistance from Hope-Flannagan funds is supporting this phase of the work.

Human Nutritional Utilization of Carotene from Sweet Potatoes

The objects of this project are to determine: (1) what proportion of carotene from sweet potatoes is utilized by human beings; (2) what relationships exist between the quality of protein intake and the excretion of the metabolites of niacin; (3) what amounts of thiamine are required by young adults; and (4) what relationships exist between carotene intake and the utilization of nitrogen and energy (calories) in the human diet. The preliminary work on this project was started in 1948. Early in 1949, three diets, namely, low-protein, high-protein (milk), and high-protein (meat), with and without sweet potatoes furnishing the sole source of carotene, were compared in a two-months feeding study using a group of eight human adults composed of five men and three women ranging in age from 18 to 28 years. Involved in this study are the determinations of carotene and vitamin A in the blood, and the analysis of the food and excreta for nitrogen, energy (calories), carotene, niacin, and thiamine. At the present time (December 1949) the following analyses have been completed: carotene and vitamin A in the blood; nitrogen, niacin, and thiamine in the urine; and carotene in the feces. From these partial data it appears that the availability of carotene in sweet potatoes for human nutrition compares favorably with that reported in the literature for other vegetables such as carrots and spinach. These data also suggest that the availability of the carotene may be influenced by the method of cooking the sweet potatoes. Furthermore, the type of diet seems to exert a strong effect on the vitamin A blood values. These interpretations of the partial data are tentative, and more precise statements will be reported when the data on nitrogen and energy in the feces have been obtained.

—WILLIAM H. JAMES, MARTHA E. HOLLINGER,
BOBBIE DELANEY, AND MARY DANIELS.

Storage Experiments with Brown Rice

Brown rice stored for one year in air-tight bags of: (1) 0.001" aluminum foil laminated to 100 gauge acetate with lacquer type adhesive; (2) 30 lb. Kraft laminated to 1.5 mil polythene using flexible adhesive; and (3) 0.0004" aluminum foil laminated to 20 lb. translucent glassine

laminated to 120 gauge pliofilm, developed no rancidity on storage at room temperature. Samples stored in ordinary cellophane, cotton cloth, and Kraft paper bags became rancid and weevil-infested in 5 months.

Packaging materials (2) and (3) above were studied during a 12-month period with respect to vitamin losses in packaged brown rice. In both cases losses of thiamine and niacin were negligible and no rancidity developed.

These investigations are being continued with additional packaging materials and finely ground brown rice.

—E. A. FIEGER AND VIRGINIA R. WILLIAMS.

The Effect of Thiouracil Upon Carcass Analysis of Chicks

It has been reported that the inclusion of thiouracil in the ration of broilers two or three weeks prior to slaughter improved their market finish. These earlier experiments did not show whether this was caused by an increased deposition of fat or an increased retention of water. This question was studied in the following experiment.

A standard basal diet was fed to six chicks for 10 weeks. During the next two weeks, three of the chicks, as controls, were continued on this diet, while the remaining three chicks received the same basal diet to which was added 0.3 per cent thiouracil. Then all the chicks were slaughtered and their carcasses were analyzed for water, protein, fat, ash and energy (calories).

These analyses showed that those chicks receiving 0.3 per cent thicuracil in addition to the basal ration contained less water, less protein, more ash and more fat than those birds receiving only the basal ration. Because of the higher fat content, the carcasses of the thiouracil-fed birds also contained more energy than those of the control birds.

These results indicate that thiouracil as used in this experiment improved the market finish by increasing the fat content of the carcass.

—A. D. TILLMAN.

A Comparison of the Growth Promoting Value of Three Vegetable Protein Feeds in Chick Rations

Linseed or cottonseed meals are not commonly used in poultry rations. It is generally agreed that either the presence of a toxic substance or an imbalance of nutrients (or both) limit their feeding value in the ration of chickens. Since it appears possible to improve the feeding value of each meal by chemical treatment, both chemically-treated linseed and cottonseed meals were compared with commercial soybean meal in the following experiment.

The test rations contained a basal mixture plus either soybean, cottonseed, or linseed meals. The basal mixture consisted primarily of the cereal grains and vitamin supplements. It was designed to supply all the known nutrients (except protein) in amounts that were needed for normal chick growth. The basal mixture constituted 85 per cent of

all the test rations, while one of the vegetable protein supplements alone or supplement plus cane sugar made up the remaining 15 per cent. This procedure made it possible to maintain a 15 per cent crude protein level in all rations. A total of eight rations with 20 chicks to each ration were tested. The rations were as follows: lot 1, control ration (L. S. U. stock ration); lot 2, chemically-treated linseed meal; lot 3, untreated linseed meal; lot 4, chemically-treated cottonseed meal; lot 5, untreated cottonseed meal; lot 6, chemically-treated linseed meal plus 0.3 per cent lysine; lot 7, untreated linseed meal plus 0.3 per cent methionine; and lot 8, commercial soybean meal.

The chicks, immediately after hatching, were wing-banded, weighed and equally distributed among the eight lots. Feed and water were given ad libitum and individual weights were taken each week during the entire experimental period of six weeks.

The average gains of the chicks which received the test rations were compared to that gain made by the chicks receiving the control ration. By expressing the gain of lot 1 as 100 per cent, the gains of the other seven lots were as follows: lot 2, 44.7 per cent; lot 3, 39.6 per cent; lot 4, 45.1 per cent; lot 5, 49.7 per cent; lot 6, 93.9 per cent; lot 7, 47.1 per cent and lot 8, 88.6 per cent.

Under the conditions of this experiment, both cottonseed and linseed meals gave much lower feeding values than did soybean meal. The chemical treatment used also did not greatly improve the feeding value of either meal. When the chemically-treated linseed meal was supplemented with 0.3 per cent lysine, however, there was a large increase in the gains of the chicks.

Since the chemical-treatment, alone, did not greatly improve the feeding value of linseed meal, these results indicate that the poor results obtained with this meal may be caused by a lysine deficiency.

—A. D. TILLMAN.

Shrimp Studies

Bacteriological

Total bacterial counts and examination for coliform bacteria were made on frozen shrimp before and after freezing, and after storage for one, two, three, four, six, nine and twelve months. The samples were stored at -40° F., 0° F., $+10^{\circ}$ F. and fluctuating between 0° F. and $+10^{\circ}$ F.

The number of viable bacteria in market shrimp was reduced by 40 to 80 per cent during freezing at -40° F. The reduction was greater in peeled than in unpeeled shrimp.

Storage at $+10^{\circ}$ F. was more destructive to the bacteria in shrimp than storage at lower temperatures. At -40° F. there was no evidence of a decrease in numbers, and at 0° F. there was little evidence of a decrease after storage for 12 months. Fluctuations in the temperature were not more lethal than constant temperature. At all temperatures

peeled shrimp had lower bacterial counts than the unpeeled ones.

Coliform bacteria were found in small numbers in 47 per cent of 208 samples. Storage at $+10^{\circ}$ F. resulted in a decrease in numbers of coliforms. This decrease was less at the intermediate temperatures and negligible at -40° F. *E. coli* was isolated more frequently than any other coliform organism and was present in 29 per cent of the samples examined.

Bacterial cultures isolated from black spots did not produce these spots when inoculated onto sterile shrimp flesh.

—E. A. FIEGER AND DORIS HOLMES.

Practical Implications

Shrimp as they are obtained from the gulf waters off the coast of Louisiana are a bacteriologically clean product. To maintain a quality product, expeditious handling and careful washing are necessary on board the shrimp trawlers, at fish receiving plants, and at wholesale and retail markets.

Improved methods of refrigeration on trawlers are suggested. The crushing of shrimp in the lower layers by the weight of the layers of ice and shrimp above should be eliminated. Steps should be taken to prevent the water from the melting ice of the upper layers from percolating through lower layers of shrimp and thus adding its bacterial load to these layers. More adequate washing and refrigeration in shore receiving plants and in wholesale and retail markets are necessary.

The quality of frozen shrimp can be improved by freezing as soon after catching as possible, by use of better containers, especially moisture-vapor proof containers, and by maintaining a temperature of 0° F. or lower during storage. Glazing can be dispensed with through use of good moisture-vapor proof containers or overwraps. Frozen cooked shrimp offer a means of extending the retail market of this seafood provided precautions are observed in respect to salt concentration, length of time of cooking and frozen storage. —E. A. FIEGER.

Pilot Plant Experiments on the Process of Freezing Eggs in the Shell

A refrigerated room of about 500 cubic feet and a metal cabinet of about 27 cubic feet capacity are being used for these experiments. A Dry-namic Automatic Dehumidifier has been used to lower the moisture of the room and a small Desomatic Dehumidifier has been used for the same purpose in connection with the metal cabinet. The Dry-namic Dehumidifier did not give satisfactory results at temperatures below 50° F. but the Desomatic unit proved quite efficient for small-scale experiments in the metal cabinet. Consequently a larger unit of Desomatic Dehumidifier has been ordered for the experiments in the refrigerated room.

Experiments also have been conducted for application of the process without the use of special apparatus by small operators, farm-

ers, and housewives. The experiments have ended successfully by the use of dehydrating agents such as dessicite or alumina. The eggs and dehydrating agent are placed in intimate contact in air-tight containers. After the eggs have lost sufficient moisture, usually 2 to 3 days or even more depending on the size of the container and the number of eggs treated, they are removed and transferred to the freezing room. For dessicite the amount of dehydrating agent required is approximately 10 per cent of the weight of the eggs. These dehydrating agents can be used repeatedly after regeneration by heat. —S. KALOYEREAS.

Freezing Preservation of Pork Sausage

A study was conducted to determine the value of various types of packaging materials in preventing development of rancidity in pork sausage during frozen storage. Some of the materials used had been previously shown to be effective in preventing rancidity of stored brown rice. Packaging materials used were: 0.001" aluminum foil mounted to 0.001" vinyl film; 0.001" aluminum foil mounted to 0.0015" polyethylene film; glassine laminated locker paper; sealed tin cans; Mason jars and freezer jars. Rancidity was evident in those samples packed in aluminum foils after two months of frozen storage, and in those samples packed in locker paper after four months. No evidence of rancidity was present in the samples stored in other types of containers after seven months frozen storage. Difficulty in completely filling the bags made from sheets of the aluminum foil and in eliminating all air may explain the rapid development of rancidity in these containers. For packaging pork sausage and similar non-liquid foods which develop rancidity rather quickly, sealed jars or cans are recommended. The containers should be completely filled and firmly packed to eliminate head space and air pockets.

— E. A. FIEGER, M. HOLLINGER, AND R. M. CROWN.

Freezing Preservation of Crayfish

Since crayfish are available only during the late spring and summer, satisfactory frozen storage would be valuable in extending their use throughout the year. For cooked preservation the crayfish were first purged (cleaned) by placing in salt water, using one pound of salt for three gallons of water. After purging they were cooked by boiling 20 minutes in water containing crab boil and salt. The whole crayfish were cooled, placed in cellophane bags, which were then sealed, and frozen. These samples were stored at three temperatures: -40° F., 0° F., and +10° F. A series of samples containing only claws and tails were also packaged and stored at 0° F.

For raw frozen preservation of crayfish, after purging, the body, shell and "black line" were removed. The flesh was then placed in cans; one series had mild brine added, the second series was sealed in an atmosphere of carbon dioxide, and the third was sealed in air. These samples were frozen and stored at 0° F.

Organoleptic tests were made after one, two, three, four and eight months. All samples were of excellent quality after eight months frozen storage. No off odors or flavors had developed, and only a slight decrease in tenderness was observed. The samples of cooked crayfish in which only claws and tails were packaged and stored, after four months storage, were dryer and less tender than similar cooked samples of stored whole crayfish. The samples of frozen raw crayfish scored slightly higher at each testing than the frozen cooked crayfish. This difference was probably caused by the better contact and penetration of salt and seasoning into the flesh of the former during the cooking.—E. A. FIEGER AND R. M. CROWN.

Frozen Storage of Cake Batters

In previous study (Annual Report 1945-46) chocolate cake batter showed greater decrease in volume of baked cakes after storage at 0° F. than did plain cake batter. Since then, determinations of the carbon dioxide content of the batter after frozen storage have shown that the decrease in volume was correlated with decreased carbon dioxide content of the dough.

The use of a pyrophosphate baking powder in place of a sodium aluminum sulfate-phosphate powder showed slight advantage. Addition of soda to the recipe improved the quality of the cakes and also improved the volume of cakes baked from stored frozen batter. Decreasing the sugar or the fat produced poorer cakes and did not improve the volume of the baked product made from frozen batter. Best results have been obtained when cake batter is sealed in air-tight containers, such as tin cans, glass jars, parchment bags or aluminum packs. When well packaged, the frozen batter can be stored at 32° F. for as long as two weeks with only slight decreases in the volume of the finished product.—MARTHA E. HOLLINGER, GLADYS WALDEN AND RUTH MARTIN.

Frozen Storage of Cooked Foods

Head cheese, smoked sausage, scrapple and liver cheese were sealed in tin cans and stored at 0° F. for a full year with excellent results. Covering smoked sausage with liquid when packing the containers produced a superior product. Samples of sausage packed in tin cans were superior to those wrapped in aluminum foil.

Comparable cans of these products were processed according to approved methods and stored at room temperature. At each testing the canned products were compared with the frozen product. In all cases the extra cooking of the processed product rendered it inferior to the frozen.—R. M. CROWN AND MARTHA E. HOLLINGER.

Storage of Pecan Meats

Storage temperature has been found to be the most important factor in preserving pecan meats. Fresh untreated shelled pecans even

in unsealed containers were of excellent quality after storage for a year at 0° F.

On the other hand comparable samples sealed in tin cans and stored at room temperature showed appreciable deterioration in flavor after five months of storage even though pasteurized. Those stored at incubator temperature (98.6° F.) were definitely rancid after three to four months of storage. The use of carbon dioxide in the sealed containers for the preservation of flavor showed only slight and irregular advantage.

The low total bacterial count found in pecan meats stored at all temperatures suggests that bacteria do not play an important part in the development of rancidity in pecans. Coliform bacteria and enterococci were not found in any samples of nut meats.

Fresh and processed pecan meats were also canned in glass jars and stored at room temperature. After 10 months storage all were found decidedly rancid.

—C. S. McCLESKEY,¹ JAMES REEVES, AND MARTHA E. HOLLINGER.

¹Bacteriologist in the Department of Botany collaborating with the Department of Agricultural Chemistry and Biochemistry.

Agricultural Economics

A New Plan for Pricing Milk in the New Orleans Milkshed

The price to be received for milk by farmers in the New Orleans milkshed is being determined by a new formula which became effective on October 1, 1949. The formula is designed to provide a flexible price plan based on changes in the demand for and supply of milk. The new price plan requires that the price paid to farmers for Class I milk be established in accordance with a formula based on the relative changes in the index of wholesale commodity prices in the United States, an index of dairy feed and farm labor costs in the New Orleans milkshed, and an index of New Orleans department store sales. Included in the price plan also is a provision designed to prevent adverse contraseasonal price movements, and an automatic price adjustment to be used if shortages or surpluses occur in the market. The new price plan was developed following a request by dairy farmers for the Department of Agricultural Economics to determine a method of pricing milk which would reflect local demand and supply conditions. Prior to the adoption of the new formula the price paid to farmers for milk was determined by adding a differential to the value of milk used in the manufacture of various milk products. The formulas based on national prices for milk for manufacturing purposes were too inflexible and failed to reflect the demand and supply conditions in the New Orleans milkshed.

The fluctuation of milk receipts from local producers in the New Orleans milkshed indicates that milk production is out of harmony with the seasonal pattern of fluid milk consumption. Therefore, in order to encourage local dairy farmers to adjust their pattern of production to market needs, a base rating plan has been included in the new price plan. The plan is designed to encourage all producers in the milkshed to deliver their full quota of milk at all times and thus to insure an adequate supply of milk for consumers in the New Orleans milkshed. The six-month period of October, November, and December of the last year and January, February and March of the current year constitutes the base period. The average daily volume of milk delivered by a producer during these months determines his "base," or the volume of milk that he is permitted to sell in Class I during the flush period of production, assuming that Class I sales during both periods are approximately the same.—WILLIAM H. ALEXANDER.

Egg Marketing in Louisiana

Although production of eggs is considered a sideline on many farms in Louisiana, the cash income from the sale of eggs during 1948 exceeded two million dollars. The sales represented about 63 per cent of the total egg production, and the other 37 per cent was used on

the farms for food and hatching. The high percentage of eggs being converted into cash emphasizes the importance of maintaining convenient and adequate local markets. Most of the producers interviewed in a current study expressed concern over the lack of adequate marketing facilities to properly handle the heavy production during the spring months.

Fifty-nine per cent of the producers interviewed in 1948 sold their eggs to city and country retail stores, which accounted for 62 per cent of the sales, and 18 per cent of the producers with 23 per cent of the volume sold principally to consumers direct. Wide variations were observed in the percentage of eggs sold to different types of buyers by owners of different sizes of laying flocks. Large flock owners having 200 or more hens and pullets sold 66 per cent of their eggs to retail stores and 13 per cent to hatcheries, while small flock owners consigned 52 per cent to stores, with no sales to hatcheries. The proportion of total eggs sold directly to consumers varied little among different sizes of flocks. Thirty-six per cent of the egg production in 1948 occurred during March, April and May. April was the peak month and accounted for 13 per cent of the total for the year. October was the lowest with only 6 per cent of the total.

Seasonal variation in the production of eggs was less in large flocks than in small flocks. During 1948 the decline in production in large flocks from the high month to the low month was 47 per cent; the decline for the same period in small flocks was 75 per cent. In large flocks about 34 per cent of egg production occurred during the period of February through May and 37 per cent during September through December. In small flocks the decline in production was from 50 per cent to 20 per cent, respectively.

On the whole, monthly production per 100 hens and pullets ranged from 1,277 eggs in March to 423 eggs in September. The rate of lay per hen was greater in large flocks than in small ones. The variation in monthly egg production is associated somewhat with such practices as starting chicks early, use of light in laying house, feeding mash throughout the year, confinement of flock during bad weather, and having a large percentage of pullets in the flock.

The average price received for eggs in 1948 by producers reporting was 47 cents a dozen. The prices received, by outlets, were: hatcheries, 58 cents; chain stores, 55 cents; consumers, 51 cents; retail stores, 46 cents; rolling stores, 43 cents; and hucksters, 40 cents. Producers reported receiving the highest prices in December and the lowest in March. Prices of eggs change inversely with change in volume of production.—RANDALL STELLY AND J. M. BAKER.

The Rice Marketing Situation

The major rice marketing problems in Louisiana during the 1948-49 marketing season were: (1) the unusual seasonal price decline developing at the peak of the rough rice movement; (2) the trend towards

the production of a larger proportion of Zenith medium-grain rice and the difficulties in moving this part of the crop; (3) the difficulties encountered in using the Government price-support program to relieve distressed situations; and (4) the long-time problem of parity prices for rice.

The solutions of some of these problems appear within the control of individual farmers. Where land and water resources permit, Louisiana rice farmers should adjust their planting program toward a balanced production of both medium and long-grain varieties. This is needed to broaden the harvesting and marketing season, reduce the risk of a surplus of one given variety causing an unusual price decline, and to take advantage of the higher prices for long-grain types.

Part of the price decline was due to low-quality rice. Although quality production did not pay during the war, it will be an important factor in relative returns in the post-war period. This may mean planting less frequently on a given piece of land to reduce red rice and weed infestations, practicing more rigid weed control, and using more careful selection of seed rice. In addition, regardless of price trends, few farmers are likely to make good returns with average yields of 10 barrels per acre or less. Thus, all practices which tend to increase yields should be carefully investigated.

The rapid seasonal price decline during the peak harvesting months for rice will continue as long as farmers continue to place most of their crop on the market in one or two months. Bulk storage facilities are needed, and these facilities should be in the form of on-farm establishments or centrally-located bulk storage installations cooperatively owned and controlled by farmers. Only by orderly marketing of the crop from month to month, by the use of efficient storage facilities under the control of producers, can the current September-October slump be solved.

Some adjustments appear to be needed in the price-support program. A general lack of information on the part of producers as to the requirements for qualifying was evident; producers need assistance in certain storage problems if the program is to apply on stored rice only, and the grading requirements and the price spread between varieties should be carefully reviewed to be sure that they represent sound practices in the industry.

The United States rice industry has changed from a prewar situation of producing about 47 million bushels annually on 1 million acres and exporting 15 per cent of the crop to the current level of producing about 80 million bushels on 1.7 million acres and exporting almost one-half of the crop. Within one to three years, the rice industry will face a very difficult decision that must be made. They must select either (1) the continuation of support prices with acreage controls and marketing allotments or (2) freedom from controls without support prices. The competitive price without controls would most likely be less than the support price for controlled production, but the possibilities for

large-volume and more efficient production would likely be much greater without controls. In view of the importance of this decision to the long-time future of the rice industry, it is to the interest of all parts of the industry to examine carefully the advantages and disadvantages of each approach. —J. N. EFFERSON.

Marketing Fruits and Vegetables Through Processing Plants

A. Dehydration of Sweet Potatoes for Feed

A study of the financial results of sweet potato dehydration for feed in Louisiana during the past three years shows clearly that volume of production is the most important factor affecting both per unit costs of processing and net returns to dehydration plants. Other factors that affect profitable plant operation include the use of cheap fuel for furnace heat, preferably natural gas if available; quality of raw material—clean, dry, sweet potatoes relatively free from decay are preferred; and efficient use of labor and equipment.

In the 1948-49 season, Louisiana dehydrating plants processed 775,000 bushels of sweet potatoes, or about 10.5 per cent of the crop. Approximately 6,750 tons of dehydrated feed were produced, valued at nearly \$400,000.

There has been a decline in the number of plants in operation, mainly because some plants have not been able to obtain adequate supplies of raw materials. Thirty-seven plants operated in 1948-49, compared with 47 in 1947-48 and 54 in 1946-47. However, there was no decline in total feed output in 1948-49 from the preceding year since the volume processed per plant increased.

Although dehydrated sweet potatoes compare favorably with corn and other carbohydrate feeds in feeding value, it is uneconomical at existing levels of production and dehydration cost for most farmers to grow sweet potatoes primarily as a feed crop. The major role of dehydration probably will continue for some years to be of a salvage nature in utilizing packing shed and cannery culls and waste. However, continued progress by research workers and members of the industry in developing higher yielding feed varieties, mechanical equipment for planting and harvesting, and more economical methods of securing plant stands in the field will increase the possibilities of sweet potatoes becoming a more important feed crop in Louisiana.

—M. E. MILLER AND M. D. WOODIN.

B. Commercial Freezing of Fruits and Vegetables

The commercial freezing of fruits and vegetables in Louisiana is a relatively new industry which has grown rapidly in recent years, stimulated by a greater demand for frozen foods and the development of improved freezing equipment and refrigeration facilities for economical storage and transportation.

In 1948, twelve commercial freezing plants processed 10,436,942 pounds of fruits and vegetables having a wholesale value of about 2.5

million dollars. Fifteen different fruits and vegetables were frozen; however, strawberries were by far the most important single product processed, accounting for 80.4 per cent of the volume and 82.2 per cent of the value of the pack. Okra was the most important vegetable packed but was only one-tenth the size of the strawberry pack. There are indications that the okra pack is increasing in importance and probably will constitute a sizeable part of the total frozen pack in future years. Other locally grown products such as broccoli, corn, snap beans, and spinach were frozen in small quantities.

Frozen foods were generally packed in bulk-sized containers for the remanufacturing and institutional trades, and in individual consumer packages for the retail trade. In 1948, 70.5 per cent of all items frozen were placed in bulk-sized containers, mainly 30-pound cans and 50-gallon barrels and drums, and 29.5 per cent in individual consumer packages, principally the 12 and 16-ounce sizes.

Commercial freezers are faced with the problems of attaining and maintaining a high quality pack and of making efficient year-round utilization of their plant facilities. If Louisiana processors are able to offer frozen products of good quality at competitive prices, it will improve their position relative to processors from other areas and enhance the possibilities for a prosperous and expanding frozen fruit and vegetable industry in the state.—M. E. MILLER AND M. D. WOODIN.

C. Commercial Fruit and Vegetable Canning

In 1948, twenty Louisiana canneries packed 1,018,374 cases of fruits and vegetables having a wholesale value of more than 2.5 million dollars. The 1948 pack was the third largest in the 9-year period 1941-48, exceeded in size only by the 1941 and 1946 packs.

Sweet potatoes were the most important produce processed in 1948, accounting for 42.4 per cent of the volume and 43.4 per cent of the value of the total fruit and vegetable pack of Louisiana canneries. Okra ranked second in importance in both size and value, and in addition, considerable quantities of okra mixture were canned. Snap beans, green peas, tomatoes, and dry peas were other items packed in fairly large quantities. The fruit pack, mainly figs, amounted to only about one per cent of the total output.

Efforts are being made by the Louisiana canning industry to increase the consumer appeal of its product. Such items as okra mixtures and a combination of new Irish potatoes and green beans are packed by several canners and appear to be meeting with favorable consumer reaction. In addition, the quality of the sweet potato pack has been greatly improved. Louisiana canneries can do much toward achieving a stable and prosperous industry by continued efforts to improve the quality of their packs in accordance with market preferences, and by promotional efforts directed toward the expansion of old markets and the development of new ones.—M. E. MILLER AND M. D. WOODIN.

Financial Results From Storing Sweet Potatoes on the Farm

Many commercial growers of sweet potatoes, particularly in the St. Landry-Lafayette area, attempt to increase the total returns from their crops each year by storing part of their production for sale later in the marketing season. In order for farm storage of marketable sweet potatoes to be profitable, it is necessary that the price received for sweet potatoes sold out of storage be more than the price at digging time plus all storage costs. In 1948-49, storage costs amounted to 21.5 cents per crate sold. Losses in storage were the largest cost item, amounting to 16.3 cents per crate sold. Other storage costs, including cash expenses, labor and overhead costs, averaged 5.2 cents per crate.

Farm storage owners realized a net gain of 48.2 cents per crate stored in 1948-49, as compared with a gain of 13.4 cents in 1947-48 and a loss of 44.1 cents in 1946-47. Seasonal price increases after harvest in 1948-49 were more than enough to offset all costs incurred in storage. Storage owners probably could have realized still larger returns if they had held their sweet potatoes longer. In both the 1947-48 and 1948-49 seasons more than 60 per cent of total farm holdings were sold by the end of January. Many growers in the last two seasons have sold their stored sweet potatoes at the first indications of price increases because of their heavy losses in 1946-47, resulting from holding until March and April.

Recent studies have shown that usually an advantage can be gained from storing sweet potatoes on the farm, because over a period of years the average seasonal price increase is sufficient to more than offset storage costs. However, price patterns in individual years may vary from the long-time average, and growers should be financially prepared to stand heavy losses in some years before investing in storage facilities and holding sweet potatoes on the farm. On the other hand, a grower, when considering an investment in a farm storage house, should not overlook the fact that the availability of storage facilities on his farm will frequently give him more bargaining power in the disposal of his entire crop.—M. E. MILLER AND M. D. WOODIN.

Farmers' Produce Markets

Studies of farmers' produce markets were continued in 1948-49 in order to determine the need for better facilities throughout the state and the conditions necessary for the successful development and operation of farmers' markets. A detailed study was made of produce marketing in the Lafayette area, an analysis of existing farmers' markets throughout the state was completed, and some additional information concerning the proposed Baton Rouge market was obtained during the year.

Of the seven organized farmers' produce markets that have operated in the state in recent years, only two were active in 1949. Various conditions are responsible for the discontinuance of the five markets that

did not operate. If these markets are to be reactivated and new markets developed where needed, careful consideration must be given to the factors that have caused success or failure in the past, and to new conditions that have arisen in recent years.

Important factors which largely determine the success of farmers' markets include: (1) economic need for new or improved market facilities; (2) volume of produce available for sale; (3) demand for the produce offered for sale; (4) cooperation and support of all interested groups; (5) method and adequacy of financing; (6) location of facilities relative to buyers and sellers; (7) adequacy of facilities and physical layout; (8) operating practices and regulations; (9) type of ownership, control, and management.—M. D. WOODIN.

Marketing Cotton in Louisiana

1. Cotton Quality Statistics

The Department of Agricultural Economics cooperates with the Cotton Branch of the Production and Marketing Administration in obtaining annual data on cotton quality. Cotton ginned from the 1949 crop in Louisiana is expected to average lower in grade than the 1948 crop, according to cotton quality reports for ginnings through December 12, 1949. Grades of middling and higher accounted for only 45 per cent of the crop as compared with 72 per cent for the corresponding period in 1948. There was a decrease in the proportion of cotton in each grade above middling and an increase for each grade below middling during 1949 as compared with 1948. The largest decrease was in the proportion of cotton grading middling and strict middling, and the largest increases in the grades of strict low middling and low middling. The proportion of ginnings reduced in grade because of rough preparation this season was 5.4 per cent as compared with 2.3 per cent for the same period in 1948. Frequent rains during the harvest season contributed toward the lower average grades and higher percentage of rough preparation in Louisiana in the 1949 season.

The average staple length of ginnings in thirty-seconds inches is expected to be somewhat longer for the 1949 crop, 33.8 as compared with 33.5 for 1948 and 33.1 for 1947. Staple lengths of 1-1/32 inches through 1-3/32 inches comprised 93 per cent of the ginnings as compared with 87 per cent for the same period last year. The proportion of ginnings 1-1/8 inches and longer increased slightly, and there was a decrease in ginnings 1 inch and shorter.

The grade index (middling white is 100) for ginnings through December 12 was 95.2 compared with 98.6 for 1948. This reduction was caused by the increased proportion of cotton classed below middling. The percentage of total ginnings tenderable on futures contracts was 89.4 as compared with 96.1 for 1948. The increase in the percentage of rough preparation accounted, in part, for this reduction.

—JAMES F. HUDSON AND ALEX M. HODGKINS.

2. Progress of the Smith-Doxey Service

Progress toward improved cotton marketing practices in the form of increased grower participation in the use of free cotton classing and marketing news services available under the Smith-Doxey Act, continued during 1949. Thirty-seven applications were received and approved for groups of producers in Louisiana in 1949, representing an increase of three group applications over the number received during 1948. The combined groups covered a majority of the cotton producing areas in the state, making practically all growers eligible to receive cotton classing and market news services.

Substantial gains were made in grower participation during 1948, when the percentage of total ginnings classed reached a high of 46 per cent in contrast to the previous high of 17 per cent in 1945. Estimates based upon actual participation to January 13, 1950, indicate that approximately 49 per cent of total ginnings of the 1949 season will be classed, representing a 3 per cent increase over 1948.

Since classification of cotton received under the Smith-Doxey Act is acceptable by the Commodity Credit Corporation as evidence of the grade and staple length of cotton for loan purposes, the increase in 1948 was attributed largely to the close proximity of the loan value to the market price of cotton during the season. This situation has not been so pronounced during 1949, as indicated by the fact that a smaller proportion of the crop has entered government loan channels. Therefore, in view of the sustained participation of growers in obtaining the classification data during 1949, it may be assumed that the service has been used to a greater extent as a marketing aid. With the increased use of these services as marketing aids and the probability that loan values will continue to approximate market prices during the next several years, we can expect even greater progress in the participation of growers in the use of the services available under the Smith-Doxey Act.

—JAMES F. HUDSON AND ALEX M. HODGKINS.

3. The Effect of Volume of Production on Cotton Marketing Practices

An analysis of data obtained on the cotton marketing practices of farmers, ginner and buyers during 1948 indicates that the marketing practices followed by cotton producers in Louisiana are affected both by the total volume of cotton produced in the trade area and the volume of production on the individual farm.

In a given area the small-volume producers sell cotton immediately after ginning and to the first bidder more frequently than do the large-volume producers. Farmers who produce equal volumes of cotton but are located in different areas, one in a high-volume production area and the other in a low-volume production area, differ in their marketing practices. The farmer in the low-volume area sells immediately after ginning and after receiving only one bid for his cotton more frequently than the producer of comparable size in the high-volume area.

The volume of cotton produced in an area also affects ginner and buyer practices. The ginner in small-volume areas combines cotton buying with ginning more often than does the ginner in high-production areas. The low-volume production areas usually do not produce cotton in sufficient volume to attract competing buyers. This often results in the ginner being the only available buyer in the area.

—ALEX M. HODGKINS AND JAMES F. HUDSON.

Agricultural Prices and Purchasing Power

The index of prices received by Louisiana farmers declined 36 points, or approximately 13 per cent, from December 15, 1948, to December 15, 1949.

Comparisons of Prices Received by Louisiana Farmers, by Groups of Products, December 1948 and December 1949¹
(August 1934 - July 1939 = 100)

Product Groups	Index as of 1948	December 1949	points	Change in percentage
Meat animals	374	311	- 63	- 16.84
Poultry and eggs	295	274	- 21	- 7.12
Cotton lint	294	254	- 40	- 13.61
Sugar cane	195	205	+ 10	+ 5.13
Food grains	314	265	- 49	- 15.61
Fruits and nuts	272	282	+ 10	+ 3.68
Feed grains and hay	219	181	- 38	- 17.35
Dairy products	265	253	- 12	- 4.53
Wool	195	187	- 8	- 4.10
Oil bearing crops	236	125	- 113	- 47.88
Vegetable and truck crops	255	235	- 20	- 7.84
ALL FARM PRODUCTS	281	245	- 36	- 12.85

¹Data are obtained through a cooperative agreement between the Louisiana Office of Agricultural Estimates, Bureau of Agricultural Economics, U. S. Department of Agriculture, and the Agricultural Experiment Station, Louisiana State University.

Prices Paid by Farmers

Prices paid by farmers for all commodities declined 7.26 points, or 3.46 per cent, from 209.68 to 202.42 per cent of the base period (August 1934-July 1939=100) from December 15, 1948, to December 15, 1949. The index of prices paid by farmers for commodities used in family maintenance declined 9.76 points, or 4.43 per cent, from 220.33 to 210.57. The index of prices paid for commodities used by farmers in agricultural production declined 4.80 points, or 2.44 per cent, from 196.80 to 192.00.

The purchasing power per unit of Louisiana farm products declined 13.01 points, or 9.72 per cent, from 133.82 to 120.81 during the year.

—J. P. MONTGOMERY.

Cotton, Louisiana's Greatest Cash Crop

Although the importance of cotton in Louisiana agriculture has declined since 1930, the crop still provides more cash for farmers than any other. Cash receipts from farm marketing of cotton lint and cottonseed amounted to an average of 46 per cent of the total cash

receipts from all farm marketings of agricultural products during the ten-year period 1924-1933, and for the ten-year period 1939-1948 the cash receipts from lint and cottonseed were only 30 per cent of the total cash income from farm marketings.

Another indication of the decline in relative importance of cotton production in the agricultural economy of Louisiana is found in the decline in the number of farms in Louisiana reporting cotton production and in the acreage of cotton reported. Reports indicate that 1,945,354 acres of cotton were grown on 128,537 Louisiana farms in 1930. By 1945 cotton acreage had declined to 811,736 and the number of farms reporting cotton production in Louisiana had declined to 79,319. The decline amounted to 38 per cent in the number of growers and 58 per cent in acres in cotton production. Cotton is in competition with foreign areas of production and with a rapidly expanding fiber industry (see Louisiana Bulletin No. 439).—J. P. MONTGOMERY.

Costs and Returns on Family-Type Sugar Cane Farms

The net cost for growing and harvesting a ton of sugar cane on family-type sugar cane farms in Louisiana declined from \$6.85 in 1947 to \$5.94 in 1948, or a decrease of almost a dollar a ton. This cost included all of the direct and indirect items of expense in producing the sugar cane crop except a charge for the value of the farmer's labor. The decline in the average cost per ton in 1948 was the first significant decrease which has occurred since 1940 and was due primarily to the above-average yield per acre obtained; the sugar cane yield on the 505 farms studied for 1948 averaged 21.7 tons per acre as compared with 18 tons the previous year.

The average net return per ton to pay the operator for his labor declined from \$1.66 per ton of sugar cane sold in 1947 to \$1.26 in 1948. This decrease in net income in the face of declining costs was due to the fact that the average price received for sugar cane was \$8.51 per ton in 1947 and only \$7.20 in 1948.

Recent trends in this annual series of cost studies from 1938 through 1948 indicate that costs per acre have become more or less stabilized at a point about double the prewar level. Based on current prices for major items used in the production of sugar cane, the costs per acre cannot be expected to decline materially in the near future. Total returns from sugar cane, however, are somewhat less than double the prewar level. Producers thus are likely to find it increasingly difficult to maintain their 1945 to 1947 level of net earnings. The long-time cost series has indicated that the family-type sugar cane growers most likely to continue to be financially successful will be those who obtain average yields of 20 tons or more per acre on their entire annual acreage; those who maintain a farm of sufficient size to utilize fully their land, labor, and equipment; and those who maintain a diversified farming program where the farm is not large enough to operate an economic sugar cane unit.—J. N. EFFERSON, M. M. LINDSEY, AND H. J. CASSO.

Mechanizing Small Delta Cotton Farms

The number of tractors on Louisiana farms increased from 2,800 in 1920 to 25,000 in 1949 and the number of work animals declined from 367,000 to 241,000. For each tractor added, five to six head of work stock were displaced. The shift from animal to tractor power has been most rapid on the larger farms and plantations. Farm managers generally agree that one medium size tractor is sufficient power for 80 to 100 crop-acres. The cost per hour for operating a tractor depends to a large extent upon the number of hours the tractor is used during the year. The small delta farmer can shift from mule to tractor power profitably only when reasonably full utilization of the power equipment can be attained.

Possibilities for reducing operating costs for tractors on small delta cotton farms include: (1) doing custom work for neighbors; (2) buying a tractor cooperatively; and (3) buying or renting additional land. Custom work affords an opportunity for fuller utilization of the tractor and at the same time provides opportunity for additional employment for the farmer. In general, cooperative ownership is practical only in cases of father and son, or brother relationships. Buying or renting additional land is a desirable means of expanding the size of the farm business and achieving fuller utilization of labor and power equipment.

The size tractor a small delta cotton farmer should buy depends upon the type of soil on the farm. A small, one-row tractor is effective where the soils are of a light, sandy texture. However, if heavy, clay soils predominate, a medium or large tractor is necessary for effective land preparation and cultivation. The size of the power unit should be adapted to the type of soil on individual farms.

Delta farmers who do not plan to dispose of their mules should not shift to tractor power. Recent studies have shown that power costs are almost doubled when two major sources of power are maintained on a small delta farm. —WARNER L. BRUNER, JR.

Farm Practices in the Delta Cotton Areas of Louisiana

A cooperative production practices study was conducted in all of the major cotton-producing states in 1948. This report has to do with practices found in the delta cotton areas of Louisiana.

Cotton was seeded at the rate of 35 pounds per acre in rows 38 to 42 inches wide. Practically all of the thinning was done by hand chopping, with the hills spaced 8 to 10 inches apart. Delta and Pine Land 14 was the most common variety of cotton planted. Only 10 per cent of the cotton acreage included in the sample was fertilized with complete fertilizer. Side-dressing, usually nitrate of soda, was used on 20 per cent of the reported acreage. The limited use of commercial fertilizer in 1947 was due, in many cases, to the shortage of fertilizer during that year.

The use of poison is closely related to the size of the cotton enterprise on each farm. Only 45 per cent of the farms with less than 20 acres of cotton used poison at any time during the past 10 years. During the same period, 54 per cent of the farms with 20 to 100 acres in cotton, and 77 per cent of the farms with more than 100 acres of cotton used poison one or more times. Calcium arsenate was used by 28 per cent of the farmers interviewed, and was applied at the average rate of 13 pounds per acre. Calcium-nicotine was used by 27 per cent of the farmers and was applied at the rate of 10 pounds per acre.

Ninety-five per cent of the cotton was picked by hand. About 4.5 per cent of the cotton was machine picked, and 0.5 per cent was snapped by hand. Approximately 1,318 pounds of seed cotton were required to produce a 500-pound bale of lint. Of this total, about 800 pounds were returned as cottonseed and 18 pounds as trash.

Approximately 67 per cent of the small farms, 28 per cent of the medium farms, and 2 per cent of the large farms used mule power exclusively. A combination of mules and tractors was the usual source of power on the medium and large farms. The man labor requirements for producing cotton varied with the size of the power unit used. With one-half row mule equipment and hand harvesting, with yields of 500 pounds of lint per acre, 165 man hours were required per acre of cotton. With two-row tractor equipment, labor requirements were reduced to 133 man hours per acre. With four-row tractor equipment, the man labor requirement was 129 hours per acre. Average wages paid for specific farm operations were: cotton choppers, \$2.70 per day; cotton pickers, \$2.50 per hundredweight of seed cotton; plow hands, \$3.00 per day; and tractor drivers, \$3.35 per day.

—WARNER L. BRUNER, JR., AND FELIX E. STANLEY.

Hogging-off Corn and Soybeans

The practice of harvesting inter-planted corn and soybeans with hogs has expanded rapidly since 1944 in the delta cotton areas of Louisiana, and has become one of the more profitable farm practices. In 1948, data concerning costs, returns, and practices were collected from 16 growers in the delta who had adopted the practice of hogging-off corn and soybeans. It was found that 14 of them had followed the practice for more than three years and were therefore experienced in the use of the practice.

Average receipts in 1948 were \$440.02 per acre of corn and soybeans hogged-off. Expenses were \$308.28 and net returns amounted to \$131.74 per acre (Table 1).

The practice was especially profitable in 1948 because the corn-hog ratio was 16.5 to 1, making it more profitable to market corn through hogs than to sell corn as grain. If the price of pork were lowered to \$15.45 per hundredweight (the 1949 fall support guide price),

TABLE 1. Average Costs and Returns per Acre of Corn and Soybeans Hogged-off, 1948

Item	Value
Average receipts per acre from sale of hogs	\$440.02
Expenses:	
Cost of hogs purchased	168.65
Pasture cost	20.00
Feed cost while on pasture	43.52
Fence cost	8.15
Worming, vaccination, tankage, minerals, and transportation	24.88
Cost of producing an acre of corn and soybeans	24.28
Interest on capital invested in hogs	4.15
Interest on capital invested in land	7.50
Miscellaneous (water, medicine, death loss)	7.15
Total	\$308.28
Net return to management per acre	\$131.74

net returns would have been approximately \$40 per acre.

The farmers planted hybrid corn varieties and early maturing soybeans seeded at the rate of 9.4 and 37 pounds per acre, respectively. Fertilizer was applied at the rate of 69 pounds of available nitrogen per acre. Estimated yields were approximately 50 bushels of corn and 20 to 30 bushels of soybeans per acre. All of the farmers interviewed vaccinated their hogs, and 12 of them wormed and sprayed for mange and lice. They also provided clean drinking water, wallows, and deep shade. The corn-soybean diet was supplemented with tankage, minerals, and salt.

An average gain of 788 pounds of pork was made per acre of corn and soybeans hogged-off in 1948. Eight hogs were finished per acre, with an average gain of 98.5 pounds per hog in 45 days. In all cases, farmers stated that the most rapid gains were made with good quality feeder pigs. —WARNER L. BRUNER, JR.

Farm Leases in the Louisiana Delta

Sixty-two farm lease contracts were examined in the delta cotton area of Louisiana during 1947. The purpose of the study was to analyze the provisions of present leasing arrangements to provide the necessary background for developing better crop-share and livestock-share leases for the area. Of the 62 farm lease contracts examined, 73 per cent were oral understandings and 27 per cent were written. Custom was the primary basis of the agreement, and many important duties of the contracting parties were not considered at the time of making the rental agreement.

Few tenants had security of occupancy for more than one year or the assurance that they would be paid for improvements made by them but unexhausted at the termination of occupancy. The leasing arrangements generally failed to provide for the maintenance and the improvement of farm buildings or the soil. Consideration of these mat-

ters is necessary for the development of sound cropping systems and the expansion of livestock enterprises on an equitable basis.

Returns in 1946 to both tenants and landlords were greater on farms renting for share and standing rents than on farms leased for cash or share-cash. Farms renting under share and standing tenure arrangements were larger by almost every measure of size, and had higher yields than those farms which were rented for cash, or a combination of share and cash. Returns to both landlords and tenants varied directly with the size of farms as measured by acres in cropland. Tenants who leased from absentee landlords received higher returns than those who leased from resident owners. Farms owned by absentee landlords were larger, and the tenants operating these farms had higher yields than those who rented from resident owners.

This study provided the basis for preparing a suggested form for a livestock-share lease and a crop-share lease. The proposed contract provides a definite incentive for tenants to take better care of the land and improvements on rented farms, and should result in higher returns to both parties to the contract. Copies of the suggested lease forms are available upon request.

—FRANK D. BARLOW, JR. AND FELIX E. STANLEY.

Financial Condition of Louisiana Farm Owners Is Sound

The current upswing of land prices associated with World War II and its aftermath reached the peak in early 1949. Average farm real estate prices as measured in dollars exceeded the level reached in 1920 by 16 per cent. An average Louisiana farm that might have been bought for \$10,000 in 1912, could have been sold for \$12,100 in 1940 and \$23,000 in the early months of 1949.

In general, Louisiana farm owners are in a sound financial condition. The "shaking out" process experienced by many farmers during the 1920's and 1930's and the extension of interest in economic matters have had beneficial effects during the more prosperous 1940's. In spite of high land prices, most Louisiana farmers have not sold their farms and therefore have them at pre-war costs. As contrasted with the World War I land boom, a majority of farmers who have purchased land since 1944, have paid cash or a substantial part of the purchase price in cash. The total mortgage debt secured by farm real estate in Louisiana on January 1, 1949, is estimated at \$64,000,000 as compared with \$50,000,000 in 1945, the lowest point since 1925. The rising debt load is associated with the purchase of additional land, but a large part of it was incurred for the purpose of making farm improvements and to finance an increased amount of operating capital, especially machinery and livestock.

In comparison with the exchange value of the dollar and with cash incomes from the sale of farm products, the mortgage debt in 1950 is less burdensome than it was in any year from 1925 to 1940.

It is true that a few farmers have acquired ownership control of farms with the aid of mortgage credit larger in amount than the farms were worth in 1939. Since a period of lower farm profits appears in prospect, farmers with indebtedness in excess of 65 per cent of 1949 values may experience financial difficulties.—BUEFORD M. GILE.

Incomes From Marketings Increase in Louisiana

TABLE 1. Louisiana: Estimated Income from Marketings by Farmers, Government Payments and Value of Products Consumed at Home in Selected Years

Year	Cash receipts from marketings			Government ¹ payments (2)	Value of home consumption (3)	Total of (1), (2) and (3)
	Crops	Livestock	Total (1)			
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1924	99,974,000	21,510,000	121,484,000		30,568,000	152,052,000
1929	134,771,000	27,026,000	161,797,000		33,625,000	195,422,000
1934	72,872,000	15,451,000	88,323,000	7,563,000	25,621,000	121,507,000
1939	84,610,000	24,955,000	109,565,000	21,184,000	30,249,000	160,998,000
1944	169,530,000	67,013,000	236,543,000	17,020,000	43,426,000	296,989,000
1948	243,785,000	107,575,000	351,360,000	8,558,000	70,698,000	430,616,000
1949 ¹	243,681,000	97,412,000	341,093,000	9,583,000	68,398,000	419,074,000

SOURCE: *Income Situation*, U. S. Dept. of Agriculture, Bureau of Agricultural Economics, Washington, D. C.

¹Preliminary estimates by Department of Agricultural Economics, Louisiana State University.

Total incomes from farm marketings in Louisiana increased from \$109,565,000 in 1939 to \$351,360,000 in 1948. Income from sales of both crops and livestock products were greatly increased owing to increased production and higher prices per unit of product. Receipts from marketing of livestock and livestock products increased from 22.8 per cent in 1939 to 30.6 per cent of the total in 1948.—BUEFORD M. GILE.

Agricultural Engineering

Sweet Potato Machinery and Equipment

Tests to determine the proper depth of soil to place over hotbed heating cables were conducted in the laboratory. This information is necessary in order to maintain an even distribution of heat for various cable spacings. For a heating cable spacing of 12 inches apart, soil above the cable should be approximately 4 inches deep. For a cable spacing of 10 inches in the hotbed the soil above the heating cable should be approximately 3 inches deep.

Cost studies for the operation of hotbeds using hot water circulated in pipes in the bed were continued for the year. Provided a cheap source of natural gas is available, this method of heating has proved to be the most economical source of heat for large-scale installations. The first cost of equipment is rather high but this is soon offset by the low operation cost.

Final design tests were conducted on a small tractor-mounted sweet potato digger. The small machine was developed primarily to operate from the small one-row tractor, and its design incorporates features that result in less bruising than the larger machines. The tractor-mounted feature proved ideal for handling the digger in small fields and narrow turnrows. Since this digger is simple in construction, light in weight, and tractor-mounted, it should be available to the small farmer at a low cost.—WILEY D. POOLE.

Seed-Piece and Mechanization Studies of Industrial Sweet Potatoes

This study was continued from 1948. Several varieties were tested from small whole-root plantings. It was found that Pelican Processor significantly out yielded L-127, Unit I Porto Rico, and L-224. Two-ounce seed-pieces of the stem end and the root end of these four varieties were used in a replicated experiment. The seed-pieces were treated in a solution of Semesan Bel prior to planting. This experiment showed that Pelican Processor and Unit I responded most favorably, although the yields of all the plots were low owing to an extremely wet season. Results for two years indicate that small whole roots are more satisfactory than cut seed-pieces for industrial plantings.

A spacing test using Whitestar and Pelican Processor planted from slips was conducted in 1949. Slips of each of two varieties were spaced 4, 8, and 12 inches apart. They were transplanted on May 30 and harvested November 2, 1949. The result of this experiment was that enough small sweet potatoes of Pelican Processor were obtained from one acre to plant 6.6, 6.7, and 8.8 acres for the 12, 8 and 4 inch spacings,

respectively. In addition, there was a yield of 205 to 228 bushels per acre of large sweet potatoes for industrial uses. The yields of Whitestar were lower but showed a similar trend.

The mechanical harvesting and bulk handling of industrial potatoes were continued for a second season, using a remodeled large Irish potato harvester with elevator for loading directly into the wagon. This machine, modified to dig sweet potatoes, reduced the labor required for harvesting to about one-sixth of that required by the old method of using plows and middle busters. This digger proved cumbersome to handle in the field and much time was lost in turning; therefore work is now being done in an attempt to make a harvester that will be easy to operate in the field and further reduce the labor required to operate it.

—WILEY D. POOLE AND TEME HERNANDEZ*

Research In Building Materials From Farm Residues

Some possibilities for the use of farm residues in building materials are being studied. A mixture of sawdust and Portland cement produces a light weight concrete of fair strength if proper care is taken. Coarse pine sawdust which has not started to decay will produce the best concrete. Hardwood sawdust should not be used. The sawdust should be allowed to soak in water several hours before using. This ensures saturation of the sawdust, which will prevent it from absorbing water from the wet cement which is necessary for the cement to develop its maximum strength. Strength decreases as the sawdust-cement ratio increases. However, depending on condition of sawdust and technique of mixing and placing, the strength may vary considerably for the same sawdust-cement ratio. It varies from 300 P. S. I. (pounds per square inch) to 1100 P. S. I. for a 3:1 mixture; 200 P. S. I. to 500 P. S. I. for 4:1 mixture; and 100 P. S. I. to 250 P. S. I. for 5:1 mixture.

The weatherability of the sawdust concrete has not yet been studied. A wall made of sawdust concrete blocks has been erected for weathering tests, but these tests will require a period of several years; therefore no data are available at present.

Concrete made from rice hulls, rice hull ashes, and cement has been tested for strength. Strengths range from 1600 P. S. I. for a rich mixture yielding only 1.7 cubic feet of concrete per sack of cement down to 225 P. S. I. for a mixture yielding 4 cubic feet per sack.

Some panels made from thermosetting resins and wood shavings had strengths of 650 P. S. I. in tension and 1400 P. S. I. in bending for 10 per cent adhesive and 90 per cent wood waste. This material may possibly be used for interior paneling. —JOHN S. NORTON.

Cotton Mechanization

The condition of the soil to which chemicals are applied for pre-emergence weed control greatly affects the control obtained. Best

*A staff member of the Department of Horticulture, L. S. U., collaborating with the Department of Agricultural Engineering.

results have been secured on beds smoothed and firmed by use of a round roller or ordinary cultipacker after planting but before application of chemical spray. Pre-emergence spraying (applying spray after planting but before emergence of crop plants) necessitates that planting be done by the hill drop method since the surface of the row cannot be disturbed as long as the chemical is effective in holding down the weed growth. If flame cultivation is to be employed when cotton is



Tractor sprayer for applying pre-emergence sprays.

large enough, forming of a smooth almost flat seedbed is desirable.

Chemical sprays were applied with a shop-constructed, rear-mounted tractor boom and a power take-off driven gear pump. Boom pressures between 20 and 30 pounds per square inch were found satisfactory, and sprays were applied in a band 12 to 14 inches wide immediately over the drill for most economical use of chemicals. Care in operating the tractor is necessary to assure placement of the spray pattern directly over the planted seed.—LAWRENCE E. CREASY AND L. E. COWART.

Anhydrous Ammonia Fertilizer Equipment

In work conducted very closely with the Louisiana State Anhydrous Ammonia Commission, a good many designs for equipment have been checked and tests made on several pieces that were offered for test.

One design worked out with a manufacturer has resulted in a simple, accurate, and rugged pressure reduction and metering valve. The valve is now in quite general use in Louisiana giving accuracies as close or closer than any other type.

To fulfill the requirements of tung orchard farmers a new machine was designed and built to meet the soil conditions, old pine stumps, obstructions, tung roots, and contoured orchards. This machine has



One-row machine for applying anhydrous ammonia to orchards.

proved most efficient and is being manufactured by one Louisiana company. Blue prints are available and have been furnished to several other states where the machine is being used for other types of orchard work.—HAROLD T. BARR.

Rice Drying With Radio-Frequency Heat

This project is a joint undertaking of the Louisiana Experiment Station and the U. S. Department of Agriculture, Agricultural Engineering Research. The application of radio-frequency (dielectric) heating to the drying of rice is being studied in its various aspects.

The principal advantage of this method of producing heat is that a volume of material may be heated uniformly throughout. That is, the heat is produced within a grain of rice rather than having it conducted inward from without. It is hoped that this method will produce a more rapid migration of moisture from the center to the outside of the rice and thereby appreciably speed up the drying operation.

Another possibility of this process to be investigated is the inactivation of enzymes. If enzymes are inactivated by treatment by radio-frequency, perhaps rice can be stored at a higher moisture content than is the common practice.—FINIS T. WRATTEN.

Rice Drying and Storage

This project is a joint undertaking of the Louisiana Agricultural Experiment Station and the U. S. Department of Agriculture Production and Marketing Administration.

Tests have been set up at the Rice Station with full size concrete, steel, and wooden bins with driers, conveyors and necessary facilities for determining the best type of construction for bin storage of rough rice for long periods of time.

Tests will be made on the maximum percentage of moisture at which the different varieties of rice can be stored in the different types of bins for long periods on the farm.

Tests are being conducted to control the weevils and other factors that might tend to deteriorate the rice in storage. It is too early to make any definite recommendations at this time.

—RUFUS K. WALKER, L. GEORGE COONROD, AND
HAROLD T. BARR.

Harvesting and Curing of Hay

Studies were conducted for the second year on methods of barn curing hay. The use of only a large central duct for distributing air through the barn of hay was found unsatisfactory for our high-moisture, heavy, early hay. This system of air distribution has given way to the modified slatted-floor system.

Using a forage harvester for gathering hay from a windrow and chopping it into long lengths after which it is finally cured in a barn drier proved to be the most economical from a labor saving standpoint. To prevent packing in the barn it was found that the length of cut of the forage harvester should be approximately four inches or longer. To prevent long-time blowing in the barn, the hay should be field dried to about 35 per cent moisture content before being chopped.

—WILEY D. POOLE AND H. T. BARR.

Frost Protection

Frost and freezes often cause heavy damage to the Louisiana sugar cane, strawberry, and winter vegetable crops. A large radiant-type, oil-fired heater was mounted on legs well above the top of the sugar cane in one test. The heater consumed 9 gallons of kerosene per hour and it was found necessary to heat for 7 hours. No frost was found within 45 feet of the heater with a low reading of 28 degrees F. for the night.

A second series of tests with two heaters mounted 150 feet apart was made in a strawberry field. No frost was found on the plants located between the heaters or on the plants facing the heater for ap-

proximately 50 feet beyond it; however, frost was found in this outside area on that side of plants away from the heater up to approximately 30 feet from the unit.

From these tests it appears that the heaters should be used in multiples of two or more to get best results.

—L. E. CREASY, J. S. NORTON, AND H. T. BARR.

Drainage For Sugar Cane Land

The Soil Conservation Service Research and the Louisiana Agricultural Experiment Station have been working jointly on this problem for the past six years. This joint undertaking has developed methods and tested equipment to grade sugar cane cuts with a crown. This grading is often called turtlebacking. This practice on 105.6 acres of test areas increased yields 5.84 standard tons of cane and 1267 pounds of sugar per acre. The test areas include plant and first-year stubble cane, varieties CP 34-120, 29-120, 36-105, and 36-13 on sandy, mixed and black land. It was further found that the maximum yields were obtained with 13 inches of crown per hundred feet, that the precision with which the grading was done has a definite bearing on yields, and small pockets of two inches or over should be kept to a minimum. It is almost inconceivable that two-inch pockets would affect a crop grown on rows 18 inches high.

In order to facilitate the cleaning of lateral ditches, the project has developed a sloping-side bucket for use with draglines. Three manufacturers are now building this bucket and there are approximately 40 of them in the cane area.—IRWIN L. SAVESON.

Animal Industry

Winter Pastures for Beef Cattle

Three six-acre winter pastures were on test in 1949-50. Field 8 included six acres of second year Kentucky 31 fescue seeded in October, 1948. Field 7 was seeded to 4 bushels of oats and 100 pounds of Dixie Wonder peas per acre October 20, 1949. In Field 5, Singletary peas were broadcast on two acres of unbroken sod July 11, 1949, and Singletary peas and 30 pounds of fescue were sown on 4 acres of prepared seed-bed October 20, 1949. One hundred pounds of ammonium nitrate per acre were put on the three pastures on December 10, 1949.

The Kentucky fescue field produced 320 pounds gain per acre during the winter, spring and summer of 1949. Continuous heavy rains handicapped grazing conditions on the oats.

Clippings were taken from representative plots of Kentucky 31 fescue and the oats on January 4 and January 30, 1950. The total tonnage of green matter was seven and a half tons for the fescue as compared to five tons for the oats. The analysis of the fescue and oats on a dry basis showed a crude protein content of 22.4 per cent for the fescue and 16.6 per cent for the oats. The fibre content was 3 per cent less in favor of the oats.

Six acres of fescue carried 12 head of 375-pound steer calves for 100 days of continuous grazing. The average daily gain was 0.563 of a pound. The six acres of oats and Dixie Wonder peas furnished 70 days of alternate grazing for seven 600-pound yearling heifers. The average daily gain was 0.967 of a pound.

Owing to a heavy infestation of red spiders and slow growth, no winter grazing information was obtained from the field of Singletary peas. —C. I. BRAY AND C. B. SINGLETARY.

Improvement of Beef Cattle for the Southern Region

Under the Research and Marketing Act of 1948 a regional project has been developed on the improvement of beef cattle through breeding methods. Thirteen states are cooperating in the southern regional area. Each state is responsible for those parts of the work which are of greatest importance within the state and in adjoining areas. The Louisiana Experiment Station in cooperation with the Iberia Livestock Experiment Farm at Jeanerette, La., is working on the relative efficiency of different crosses of Brahman-Angus and Africander-Angus steers in the feed lot. A pasture area of 300 acres on the University farm at Baton Rouge has been sub-divided into 6 breeding pastures

of 50 acres each. The following different crosses are to be compared as to growth rates, feeding efficiency and carcass quality.

Lot. 1. Crossbred herd $3/8$ Africander- $5/8$ Angus from the Iberia Livestock Farm

Lot 2. Charbray sire crossed on grade Angus, grade Hereford and $1/4$ Brahman-Hereford cows

Lot 3. Hereford sire crossed on grade Hereford, grade Angus and $1/4$ Brahman and $1/2$ Brahman

Lot 4. Angus sire crossed on grade Hereford, grade Angus and $1/4$ Brahman

Lot 5. Brahman sire crossed on $1/2$ and $1/4$ Brahman grades.

At the North Louisiana Experiment Station a herd of Red Africander-Angus crossbreds is being crossed with the Devon and comparisons made between these crossbreds and purebred Devons.

—S. E. McCRAINE, C. I. BRAY, C. B. SINGLETARY, RALPH WOODWARD,
J. L. HEATH, JR., R. M. CROWN, AND J. B. FRANCIONI, JR.

Fattening Steers With Molasses Fed In Various Ways

Five lots of 8 calves each were fed the following rations: Lot 1 — corn 79%, cottonseed meal 21%; Lot 2 — corn 46%, cottonseed meal 23%, molasses-bagasse feed mixture 31%; Lot 3 — corn 46%, cottonseed meal 23%, molasses-cottonseed hulls mixture 31%; Lot 4 — corn, 46%; cottonseed meal 23%, blackstrap molasses 31%; Lot 5 — corn 28.6%, cottonseed meal 28.6%, blackstrap molasses free choice 42.8%.

A good grade of prairie hay was fed free choice in all lots with one feed of green alfalfa feed per week to supply vitamin A. Salt and mineral matter were also supplied free choice.

The molasses feed mixtures did not prove as satisfactory as the straight molasses. The bagasse-molasses lot and the molasses-cottonseed hulls lot went off feed several times during the course of the experiment.

The results for the 112-day feeding period were as follows:

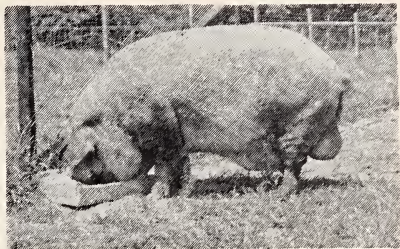
Lot	1	2	3	4	5
Average Daily Gain (Lbs.)	1.848	1.455	1.366	1.991	2.017
Average Sale Price per Cwt	\$24.94	\$24.53	\$24.97	\$25.00	\$24.59
Average Sale Value per Head	\$174.58	\$159.59	\$162.13	\$177.32	\$172.42
Average Live Weight Grade	Low-good	Low-good	H-medium	Low-good	Low-good

—S. E. McCRAINE, C. I. BRAY, C. B. SINGLETARY, R. M. CROWN,
AND J. B. FRANCIONI, JR.

Selection and Improvement of Duroc-Jersey Swine

The old Duroc herd sire, L.E.S. Invincible, 263713, qualified as

Production Registry sire in 1949 with 15 qualified litters. He is the 26th sire of the breed to be so qualified, following his sire, Invincible, 174463, P. R. No. 6. The oldest sow in the herd, L.E.S. New Honduras, qualified her sixth consecutive Production Registry litter in 1949, averaging 393 pounds per litter. One of her gilts by L.E.S. Invincible won the open championship in the fat class at the 14th annual L.S.U. Livestock Show, another of her gilts was junior champion in the breeding class in the same show, and a boar, L.E.S. Innovator, of identical breeding, was grand champion in the 1950 show.



L. E. S. Invincible, chief Duroc herd sire, qualifies as Production Registry sire No. 26.

As an indication of the value of Production Registry testing, pigs from these accredited herd sows make top gains in the feed lot. In the summer feeding tests a gilt by L.E.S. Invincible out of L.E.S. Actina Special, a 5-star sow, made the highest gains per day of any breed, 263 pounds in 180 days, a gain from birth to market of 1.46 pounds per day. In the winter feeding tests a barrow by the same sire and dam made the highest gains of any breed, 246 pounds gain in 170 days, an average of 1.45 pounds per day from birth to market.

A closely line-bred boar from Oklahoma A. & M. has been added to the Experiment Station herd.—CHAS. I. BRAY.

Crossbred Swine

The three-way cross, Hampshire-Poland China-Duroc, is being continued. The sow in the accompanying illustration, which was sired by a Duroc, was the seventh cross in the series and her litter sired by a Poland was the eighth cross. This crossbred litter when fed out in



Old Black, an excellent type of crossbred sow, never failed to make Production Registry requirements with her litters.

winter feeding tests made an excellent record. They made an average daily gain of 2.21 pounds per day and required 357 pounds of feed per 100 pounds gain. A group of purebreds on the same ration gained 2.17 pounds per day and required 380 pounds of feed per 100 pounds gain. Three gilts from this litter were bred, and raised a little better than an 8-pig average in the fall of 1949. All three exceeded Production Registry requirements on litter weights at eight weeks of age.

This crossbreeding work shows that there are no undesirable effects from continued crossbreeding where good selection is practiced both in choosing sires and breeding sows.

Two crossbreds of a new type, a boar and a bred sow, 3/4 Landrace and 1/4 Large Black, were obtained from the Bureau of Animal Industry, Beltsville, Maryland, for additional work in crossbreeding.

—C. I. BRAY AND C. B. SINGLETARY.

Effect of Hog Wallows on Summer Gains of Fattening Hogs

This experiment, started in 1948, was repeated in the summer of 1949. Four lots of pigs averaging 76 pounds were started on the same ration on June 28. Lot 1 was fed in a dry lot. Lot 2 had a shallow concrete wallow. Lot 3 had a portable metal-lined wallow. Lot 4 had access to a mud wallow.

Thirty-six days of rainfall between June 28 and August 26 affected the results of the 1949 trial. The continued rain made it impossible to keep mud holes out of the dry lot and kept the temperatures abnormally cool during most of the test. No appreciable differences were shown in economy of feed consumption, Lot 1 (no wallow) requiring only five pounds more feed per 100 pounds gain than the lots with wallows. The average daily gains were as follows: Lot 1 (no wallow) — 1.56 pounds per day; Lot 2 (concrete wallow) — 1.75 pounds; Lot 3 (portable metal wallow) — 1.60 pounds; and Lot 4 (earth wallow) — 1.66 pounds per day.

The pigs having access to the unsanitary mud wallow broke out with a serious skin eruption three weeks before the end of the trial. When the pigs were fenced off from the mud wallow and sprayed twice with benzene hexachloride the skin trouble cleared up in about ten days.—C. I. BRAY AND C. B. SINGLETARY.

Rations for Fattening Swine With Various Protein Supplements

Three lots of pigs divided equally as to breed, sex, age and weight were started on feed January 6, 1950. All lots had one-third acre of good winter oat pasture. The rations were as follows: Lot 1 — corn 65%, solvent extracted rice bran 35%, no protein supplement; Lot 2 — corn 59%, solvent extracted rice bran 30%, protein supplement 11%,

equal parts Menhaden fish meal and soybean oil meal; Lot 3 — corn 84%, Menhaden fish meal 4%, soybean oil meal 12%.

Results of the 68-day feeding period were as follows:

Lot	Pounds of Feed Per Pound of Gain	Average Daily Gain
1	443.8	1.365
2	410.9	1.514
3	344.9	1.895

The lot receiving no protein supplement made satisfactory gains as long as the oat pasture lasted but slowed down as the experiment progressed. This lot consumed 30 per cent more mineral mixture than the lots receiving the protein supplement. The corn ration made better gains and required less feed per pound of gain than the ration of corn and rice bran.

On the basis of a three-year comparison with dry lot feeding, the oat pasture saved 35 pounds of feed for each 100 pounds of gain.

—C. B. SINGLETARY.

Production of Fall Calves

The second year of an experiment to test possibilities of producing fall calves for early summer sale started on November 9, 1948. Fifty cows of Angus, Angus-Hereford, Hereford, Brahman-Hereford and Brahman-Shorthorn breeds and crossbreeds with calves by side were weighed and placed in an 80-acre pasture. Birth dates ranged from August 15 to November 9, 1948. On January 4, 1949, the cows were separated into two groups in order to make a comparison of calves creep fed on pasture with calves not creep fed. On April 25, 1949, the creep fed calves averaged 408 pounds and the non-creep fed calves 409 pounds. According to three appraisers there was no difference in value of the two lots. The calves brought 28c per pound, or



Fall calves sold April 25, 1949, brought \$25 more per head than spring calves sold in November.

\$114.38 per head. The non-creep fed calves showed an estimated net profit of \$97.84 per head as compared to \$94.12 per head on the creep fed calves. The difference was mainly in the cost of the feed.

Spring calves in 1949, from similar cows, weighed 447 pounds at an average age of 244 days, and brought 20¢ per pound, or \$89.40 per head, when sold in November. Even though the fall calves were marketed at lower weights they netted almost \$25 more per head than the spring calves.

The extra care required in wintering cows with fall calves was not significantly greater than that of cows calving in the spring. The extra feed for the cows with fall calves was 90 pounds of cottonseed cake per cow and calf, or \$2.92 per cow.

Not many beef cattlemen are situated so that they can raise good fall calves for spring sale, but it seems evident that fall calves will prove profitable where they can be given good care, owing to the higher prices paid in the spring as compared to the fall. By breeding part of the herd for fall calves and the rest for spring calves it is possible to get a higher percentage calf crop and also have a more uniform distribution of labor and income throughout the year.

—S. E. McCRAINE AND JAMES RILEY.

Hill Pasture Investigations

Investigations were continued with the Donaldson-Bankston herd at Dry Prong, Louisiana. No fertilizer was applied in 1949. Fertilizer



Cows taken from limed and fertilized field November 1, 1949, show excellent condition.

had been put out in 1948, but on account of dry weather in 1948 little grazing was obtained after the end of May. The limed field (limed, fertilized and seeded in 1941) produced 300 pounds of gain per acre in 1949. A fertilized woodland pasture, seeded only with lespedeza and fertilized but only partially limed, produced 128.2 pounds per acre. From August 31 to November 1 cattle on the limed field gained 57.3 pounds per head, the cattle on fertilized woodland gained 27.4 pounds and the cattle on unfertilized woodland gained 3.7 pounds per head.

On November 1 a blood test was made on 10 or 12 animals from each of the three herds. There were no great differences in the calcium-phosphorus content, showing that the cattle on unfertilized pasture the latter part of the season had stored up enough mineral matter during May and June on fertilized pasture to last through the season. This is important to the cattle grower who has both fertilized and unfertilized pastures, since he can make use of both types of pasture to advantage without serious loss of blood calcium and phosphorus during times when cattle are on unfertilized land.

—C. I. BRAY, C. B. SINGLETARY, MIXON BANKSTON,
AND SOUTHERN FOREST EXPERIMENT STATION.

Special Pasture Investigations

Preliminary results on Earl Simpson's farm in DeSoto Parish indicate that late winter and early spring grazing can be profitably produced with a combination of fescue grass and crimson clover. This planting was made in the fall of 1948 with the idea of getting grazing before that produced by white clover. The land was treated with one ton limestone and 600 pounds of 3-12-12 per acre. No weights were secured. However, this area carried one animal unit per acre from February 1 to May 1. At that time, the cows were removed and a hay crop was cut, averaging 1½ tons per acre. Rainfall during the summer was above normal and caused the fescue grass to have a good carrying capacity all during the summer.

Spring-planted Dallis grass was compared to fall-planted. On September 1, 1949, both plantings had given good grazing; however, the fall-planted grass was irregular, with good stands only where clover growth was not so rank. The spring-seeded grass had a uniform stand over the entire area. Both plots were seeded at the rate of 15 pounds per acre. The seed was planted on a prepared seedbed, using a culti-packer before and after seeding.

Five-year results on cutover pine lands in Beauregard Parish show that the most economical gains of beef per acre were produced on land limed, seeded and maintained by an annual application of 400 pounds of 0-14-7 annually. This treatment produced a five-year average of 358 pounds of beef per acre as compared to 263 pounds on plots that were annually treated with 200 pounds of 0-14-7 per acre. On similar plots where no lime was used only 169 pounds of beef were

produced. Phosphate alone over a five-year period produced only 93 pounds of beef per acre.

Outfield work in Bienville Parish indicates that hairy indigo can successfully be used as a supplemental grazing crop when other crops fail because of dry weather. —W. E. MONROE.



Crops and Soils

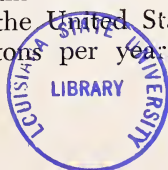
Anhydrous Ammonia and Other Materials as a Source of Nitrogen for Sugar Cane

The average application of commercial nitrogen per acre to sugar cane has increased from 32 pounds in 1941 to over 50 pounds in 1949. This increase has been stimulated by the large developments in the production of cheaper sources of nitrogen, particularly anhydrous ammonia and ammonium nitrate. Their use has given excellent results and has compensated in general for the slackening off in the amount of nitrogen being turned under in legumes. The use of more commercial nitrogen is also compensating for the increased liberation and loss of humus nitrogen brought about through summer fallowing associated with the control of Johnson grass. Fertilizer trials and experiments are showing that 40 pounds of commercial nitrogen can be profitably applied to plant cane where large amounts of legumes (10 tons or more green weight per acre) have not been turned under. To put it another way, it can be said that unless a planter turns under at least 120 pounds per acre of nitrogen in legumes he will need to add some commercial nitrogen to plant cane. Legume nitrogen may be from 35 to 70 per cent as effective as commercial nitrogen. The tests are also showing that 60 to 80 (to 100 under some conditions) pounds of nitrogen should be applied to stubble cane.

The use of phosphate and potash fertilizers on the heavy soils has not yet been established as good practice, but on soils with medium texture, relatively low organic matter content (1.6-2.0 per cent) and shallow topsoil the use of 60 to 80 pounds of nitrogen per acre with 25 to 40 pounds of P_2O_5 and 40 to 60 pounds of K_2O applied to stubble cane is giving good results.

Louisiana is using about 7,500 tons of commercial nitrogen annually on sugar cane. If the average yield of cane were raised to 30 tons per acre—and experimental results show that this could be done—11,000 tons of commercial nitrogen would be required if the soil organic matter was increased proportionately. If the organic matter of these soils is not increased, 17,000 tons of commercial nitrogen would be required. With the generally poor physical condition now existing in the soils there are limitations on the use of nitrogen and the yield of cane. By increasing the depth of the soils and the organic penetration and granulation more commercial nitrogen can be used effectively.

The two most important new nitrogen products on the market in Louisiana now are ammonia and ammonium nitrate. Out of a total net supply of 955,000 tons of nitrogen in the United States, ammonia for direct application amounts to 45,000 tons per year. Ammonium



nitrate amounts to 134,000 tons of nitrogen per year. In Louisiana, however, ammonia accounts for a relatively larger percentage of the nitrogen. Out of a total nitrogen consumption of approximately 25,000 tons, ammonia accounts for 5,500 tons. Ammonium nitrate for direct application, exclusive of that in nitrogen solutions, accounts for 7,000 tons of nitrogen. As time goes on ammonia and ammonium nitrate will continue to be more and more important as sources of nitrogen in Louisiana.

Ammonia is especially well adapted for use on sugar cane. Usually, nitrogen is the only element applied to cane. The ammonia can be applied early with minimum leaching losses. Ammonia will continue to be the cheapest source of nitrogen and the easiest to apply. Even in the case of an application with minerals, the minerals can be applied at the rate of 400-500 pounds per acre of 6-8-12, 5-10-10 or 0-12-12 from hoppers on the sides of the tractor while 60 pounds of nitrogen as ammonia is being delivered in the soil through the regular applicators. Ammonia lends itself well to preplanting and split applications. These are practices that should be worked out more fully in the future.

During 1949 two experiments were conducted for the purpose of testing the comparative value of different nitrogen materials on the production of sugar cane and sugar. The materials tested were anhydrous ammonia, ammonium nitrate, calcium cyanamid, sodium nitrate, uramon, and ammonium sulfate. These materials were added at the rate of 60 pounds of nitrogen per acre with 40 pounds of P_2O_5 as superphosphate and 60 pounds of K_2O as muriate of potash. With the exception of the anhydrous ammonia, the nitrogen carriers were mixed with the superphosphate, 20 per cent, and the muriate of potash, 60 per cent. The fertilizers were applied in the off-bar furrow of stubble cane and covered immediately by the first dirting. In applying anhydrous ammonia the phosphate and potash were mixed and applied just before the ammonia, which was put below the minerals in the off-bar furrow with applicators. Then the off-bar furrow was covered by the first dirting. The treatments were made in randomized blocks and replicated three times. Each replicate consisted of 0.1 acre in three rows.

In the experiment on Commerce clay loam at Little Texas Plantation, Napoleonville, there was no response to phosphate or potash, but there was a marked response to all the nitrogen carriers. The soil is neutral and naturally well supplied with available phosphorus and potassium. Uramon and ammonium sulfate gave significantly higher yields of both sugar and sugar cane than calcium cyanamid, but they were no better than ammonium nitrate, sodium nitrate or anhydrous ammonia. Sixty pounds of nitrogen in the different forms gave increases in yield that varied from 5.6 to 8.9 tons of cane per acre.

Data collected from an experiment on Baldwin silt loam at Katy Plantation, Franklin, showed that all the sources of nitrogen were, within the limit of experimental error, equally effective in increasing the yields of both sugar and sugar cane. In this experiment the phos-

phate and potash applied with the various sources of nitrogen were also significantly effective in increasing yields. The soil has a pH of 6.2 and is deficient in both available phosphorus and potassium as shown by soil tests. The increases from the complete fertilizers carrying 60 pounds of nitrogen in the different forms varied from 7.1 to 8.5 tons of cane per acre. —JACK D. DeMENT AND M. B. STURGIS.

Complete Fertilizers for Sugar Cane

Outfield experiments were conducted at nine locations on six different soil types in 1949. There were two experiments with plant cane, four with first stubble and two with second stubble. There was also one experiment with minor elements applied to plant cane.

There was no response to any of the fertilizers applied to plant cane on commerce clay loam at Idlewild. The lack of response was likely due to the fact that clover had been grown on the field for several years prior to the test.

In the experiment with plant cane on Lintonia silt loam at Billeaud's plantation, 40 pounds of nitrogen alone gave increases of 4.8 tons of cane and 1047 pounds of sugar per acre. No other treatment was better than the nitrogen only.

In two experiments with first stubble cane, the highest yields were obtained from mixtures containing 80 pounds of nitrogen, 40 pounds of P_2O_5 and 60 pounds of K_2O per acre. In two other experiments 80 pounds of nitrogen alone proved to be as good as any other treatment.

Highly significant increases were obtained from the use of complete fertilizers in two experiments on second stubble cane. On Iberia silt loam at Dr. J. L. Beyt's farm, the highest yields were obtained from the application of 60 pounds of nitrogen, 40 pounds of P_2O_5 and 60 pounds of K_2O . In the other experiment on Iberia silt loam at Glencoe-Vachiere plantation, a mixture of 80 pounds of nitrogen, 40 pounds of P_2O_5 and 60 pounds of K_2O was the best treatment.

A test with minor elements was conducted on a puddled Sharkey clay soil underlain at 6 to 8 inches by an organic layer. There was some indication that application of minor elements may be of value on such soils; however, the plots were grassy and the stand poor. The data from this one test do not show that beneficial effects were obtained.

—JACK D. DeMENT, V. E. GREEN, JR. AND M. B. STURGIS.

Cotton Investigations in 1949

Variety Trials

Cotton variety tests were conducted at the stations of Baton Rouge, St. Joseph, Calhoun, Homer, and Bossier City. These tests consisted of principal commercial varieties, and more promising advanced and new strains from the Baton Rouge station, sub-stations, and out-of-state cotton breeders. Detailed reports of each of these tests at these five locations are available and may be obtained upon request from the stations mentioned above.

The highest yielding varieties from the Baton Rouge station for the past three years were Louisiana 33, Delfos 9169, Deltapine 15, Coker 100 W. R., Empire and Smith 78. The highest yielding varieties at St. Joseph for the past three years were Deltapine 15, Delfos 9169, Delfos 651, Coker 100 W. R. and Empire. The results from Calhoun tests of 1947 and 1948 show that Louisiana 33, Stoneville 2B, and Deltapine were the leading varieties; while at Bossier City, Empire, Deltapine 15, Coker 100 Staple, Coker 100 W. R., Louisiana 33, and CSS9 were the leading varieties for the past two years. The Homer tests indicate that Empire, Stoneville 2B, Louisiana 33, Miller 610, and Deltapine were the leading varieties in the 1948 and 1949 tests.

The three varieties Deltapine 15, Louisiana 33, and Empire were among the leading varieties at all of the above mentioned stations during the years of testing. These three varieties have a wide adaptation. Their performance in these tests shows that they are adapted to any cotton growing area of Louisiana. Their characters are very similar with a few exceptions. Deltapine 15 is a variety that produces an average of 39.8 per cent lint, staple length of 1 1/16 inches and 82 bolls per pound; Empire produced an average of 36.2 per cent lint, staple length of 1 1/16 inches and 68 bolls per pound; while Louisiana 33 produced an average of 37.5 per cent lint, staple length of 1 1/32 inches and 83 bolls per pound.

Breeding

One hundred and sixty-two superior progeny selections were tested in 1949 at Baton Rouge, Bossier City, and St. Joseph, Louisiana. The Coker W. R. 5 and Coker 4 in 1 tested at St. Joseph produced some interesting results. The new progenies all produced more lint per acre than the commercial check variety. Twenty out of a group of 31 significantly yielded more lint per acre than the commercial check variety.

The complex inheritance of most of the desirable agronomic characters of cotton requires that a large number of plant selections be grown and analyzed to obtain the desired combination. Many selections prove outstanding in some characters but frequently are lacking in other properties. The plant breeder must combine these desirable factors into one strain. By controlled hybrids, by selfing, re-selecting and testing for several generations we are able to find the plant that possesses the desired characters.

In the breeding work, resistant factors for fusarium wilt (*fusarium vasinfectum*) and bacterial blight (*Xanthomona's Malvacearm*) have been transferred to commercial varieties that have proved to be superior performers in Louisiana. These new progenies will be further tested in the 1950 tests for suitable agronomic characters.

Fiber

With the establishment of a modern fiber laboratory at Louisiana State University, a program for breeding of fiber quality on a much

larger scale than was ever before possible, was begun. During the first year of the program, some 5000 plant selections from existing commercial varieties and hybrids made by the Louisiana Agricultural Experiment Station were made to isolate strains of improved fiber qualities of strength and length. In 1948 progenies from the best 1947 plant selections were grown and re-selection made for laboratory testing. It was noted that some varieties carry genes for very strong cotton (87,000 to 92,000 pounds per square inch). These very strong plants will be used as parents for crossing with other varieties that possess superior fiber qualities; many desirable characters may thereby be incorporated into one controlled hybrid strain of cotton. The fiber laboratory has enabled cotton breeders at the University to scan large populations in the search for outstanding fiber qualities.

—F. W. SELF, J. R. COTTON, AND WILLIE K. O'QUIN.

Outfield Experiments on Cotton, Corn and Oats

Cotton

The projects on the fertilization of cotton included experiments using commercial grades now recommended for cotton fertilization, experiments on the sodium-potassium relationship in the nutrition of cotton, studies of the effects of calcium and magnesium in the growth of cotton, and studies of the effects of lime, sulphur, and minor elements on cotton

Increases in yield of seed cotton have been obtained on Almont very fine sandy loam at Oak Ridge, Louisiana, from the application of 600 pounds of 8-8-8 per acre plus 600 pounds of dolomitic lime. At this location the plots receiving no fertilizer produced 918 pounds of seed cotton per acre. From the application of 600 pounds of 8-8-8 the yield was increased 514 pounds. When 600 pounds of 8-8-8 per acre were applied plus 600 pounds of dolomitic lime the yield was raised to 1635 pounds per acre. The dolomitic lime was applied before the complete mixture.

Results from an experiment conducted on Linton's silt loam at Winnsboro indicate there is a definite deficiency of P₂O₅ and K₂O at this location. It has been the general practice in the area where this experiment was established to apply nitrogen alone in the fertilization of cotton. As a result of this experiment and two years' work prior to this, it has been found that complete mixtures of 6-8-8 or 8-8-8, at the rate of 600 pounds per acre have given the highest yields. Further increases in yields have also been obtained from applying dolomitic lime at the rate of 600 pounds per acre in addition to the complete mixtures.

Experiments for studying the role of sodium as a nutrient element in the growth of cotton, particularly the ability of sodium to substitute for potassium, have been conducted for three years on six different soil types at nine locations. On soils deficient in potassium, nitrate of

soda gave higher yields than ammonium nitrate when applied alone or in combination with phosphate. In seven out of the ten experiments nitrate of soda in combination with phosphate and potash gave higher yields than ammonium nitrate. The addition of sodium to complete mixtures containing ammonium nitrate, superphosphate, and muriate of potash increased the yield of cotton significantly.

The results of one year's study on the effects of lime, sulphur, and minor elements on cotton conducted at the North Louisiana Hill Farm Experiment Station on Norfolk loamy sand show that liming with the application of sulphur, borax, and copper sulphate in the 8-8-8 mixture produced the highest yield of seed cotton. At this location 422 pounds of seed cotton per acre were obtained from the application of 600 pounds of 8-8-8. When 600 pounds of 8-8-8 plus 1000 pounds of dolomitic lime, 320 pounds of sulphur, 5 pounds of borax, and 5 pounds of copper sulfate per acre were applied, the yield was increased 866 pounds per acre. The average yield of seed cotton per acre obtained from this treatment was 1288 pounds.

Corn

Field experiments on corn were conducted in cooperation with individual growers under ordinary farm conditions. Four different soil types were selected in establishing these experiments. Nitrogen was applied at the rates of 48, 72 and 96 pounds per acre. The nitrogen was applied as side-dressing, and in the complete mixtures of 5-10-10 applied before planting.

The highest yield obtained in 1949 was 92.0 bushels from the application of 300 pounds of 5-10-10 per acre plus 81 pounds of nitrogen as side-dressing to corn on Almont very fine sandy loam at Collinston. Nitrogen applications profitably increased the yield in all experiments; however, in all the tests the highest yields resulted where phosphate and potash were also added.

The response to phosphate was not as marked as that of nitrogen, but in two experiments, one on Almont very fine sandy loam at Collinston and the other on Portland very fine sandy loam at Opelousas, the increase in yield from phosphate was significant.

Oats

A five-year study has been made on the fertilizer recommendations for four soil types in this state. The results of these experiments have shown that high yields of oats have been obtained on alluvial soils by applying 48 to 60 pounds of nitrogen as top-dressing. On soils of the coastal plains, coastal prairies, Mississippi terrace and on the lighter alluvial soils the best yields have been obtained from the application of 300 pounds of an 8-8-8 or 5-10-10 mixture per acre, plus 32 pounds of nitrogen per acre.—JAMES GREGG MARSHALL.

New Varieties of White Clover

New varieties of white clover are being tested for the first time this season. These varieties were developed by combining selected lines from

seed collected in fields of native stocks. The lines have been under close observation since April, 1946, and have excelled in heat tolerance, vegetative vigor and seed production. Further, it has been shown by field experiments that they are able to transmit these characteristics to the succeeding generation through polycross combinations with other lines. These clonal lines have been living throughout the years since the seedlings were transplanted to the field in April, 1946. It is felt that varieties formed by a combination of germinal material possessed by these lines should be outstanding for forage and seed production.

In the fall of 1948, yield tests were planted with the new varieties at Baton Rouge and at each of the branch Experiment Stations. The forage yields of these varieties will be compared with Louisiana white, Ladino and other varieties and strains of white clover planted in the state.

A forage yield trial with polycross combinations of 15 clonal lines was conducted during the season of 1948-49. The total yield of green forage for the entries ranged from 16,342 to 33,930 pounds per acre. Ladino was used as the check variety and it produced 25,332 pounds of green forage per acre. The forage was cut in April, June, August, and November, and the average for all entries for each cutting was as follows: April, 14,068; June, 3,263; August, 3,962; November 6,460 pounds



Seed increase block of new variety of white clover.
Photographed January 20, 1950

per acre. In a test with 16 entries Ladino ranked thirteenth. Ten of the polycrosses were significantly better. It is important to note the yield of these entries for November. Perhaps there is no other species

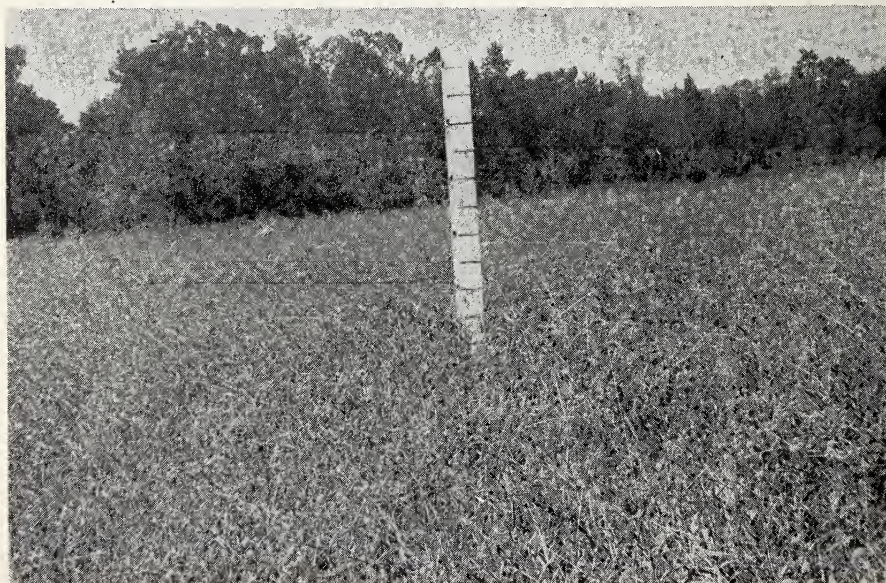
of clover which will give as much growth during the fall as these polycrosses have produced, and the lines from which the seed of these were taken have been outstanding for this during the past three years.

—C. R. OWEN.

Experiments With Dallis Grass Seed Development

Greenhouse experiments were conducted with Dallis grass to determine the seed setting potential of a number of lines isolated from native stocks. Profuse heading was induced during February and March by using artificial lights to extend the period to about 15 hours daily, using fluorescent lights. The temperature was maintained above 65° F. There was no ergot present and the fluctuation in the number of caryopses formed was due to factors other than the disease usually present in the field. In this material fertility varied with the date of harvest as well as between lines and between plants within a line. For heads maturing March 1, the average number of caryopses per hundred florets was 10.7. The highest set for a single plant was 27.8 per cent and the lowest 1.3 per cent. On seed heads maturing April 1, from 37 plants, the average number of caryopses formed per 100 florets was 16.6. The range was from 32.9 to 2.6 per cent. Although there was considerable variation among heads taken from one plant, the more fertile lines were consistently above the average in seed development.

Seed development was higher in the field than in the greenhouse in spite of the fact that ergot was present. Seed heads collected from the



The third crop of seed during a single season from new strain of Dallis grass, November 10, 1949.

field from certain of the lines also included in the greenhouse formed caryopses in 23.8 per cent of the florets, as compared to 15.7 per cent in the greenhouse. There were 60.4 per cent empty florets and 15.8 per cent diseased florets. These heads were collected in October when ergot development is not so high as during the summer months. It was considered that conditions in the field in October were more like those of the greenhouse than other months during the growing season. Obviously physiological factors play a major role in the formation of seed, and the conditions in the greenhouse were not sufficiently near the optimum for Dallis grass.

It has been observed that second year stands make best yields of seed. Usually one season is required for plant development. During the second year the plants are at the peak of performance and two to three seed crops may be harvested. There may be a decline after the second year unless adequate fertilizer is applied to correct the apparent decline in available nutrients.—C. R. OWEN. 11

Choice of Species, Varieties and Strains of Forage Crops Is Important

Red Clover

Ten varieties and strains of red clover were harvested four times for forage yields; also a hay and seed harvest were made. From the results of these forage, hay, and seed yield trials, Louisiana regional strain, red clover, Cumberland, and Louisiana experimental strains numbers 79 and 714 were better than the other varieties. Other varieties included were Midland, Wisconsin mildew resistant, van atta and Kenland. The varieties Kenland and Midland did not differ significantly in forage production.

The seed yields were relatively high for the amount of forage produced. Seed from all varieties and strains showed a high per cent of viability and few hard seed. This was possibly due to the method which was used in threshing the seed. They were threshed by passing the material through a hammer mill.

Annual Clover Species and Varieties

A soil with good internal drainage, along with proper fertilization and liming, will produce excellent crimson clover. On the other hand, Persian clover and certain varieties of subterranean appear to be tolerant of poorly drained soils, even with low organic matter content, and will produce very good growth.

From the results of tests with forage, hay and seed production, including eighteen different species, varieties, and strains of annual clover, two varieties of subterranean clover and Persian clover were outstanding. The subterranean varieties, Bacchus March and Mt. Barker, were outstanding for both forage and seed production. These results were obtained on an Olivier silt loam soil which has poor internal drainage.

Another test with three strains of reseeding crimson clover was planted on Dyer silt loam soil, a soil type with better drainage. Both soils received the same fertilizer and lime treatments, and the pH was approximately the same at the time of planting. Crimson clover gave excellent yields, much better than on Olivier silt loam. The varieties Dixie and Auburn were planted in both tests. The comparative acre yields of air-dry forage were as follows:

<u>Soil Type</u>	<u>Yield per Acre (Lbs.)</u>	
	<u>Dixie</u>	<u>Auburn</u>
Olivier silt loam	356	356
Dyer silt loam	7829	5856

Big Trefoil and Birdsfoot Trefoil

The trefoils are comparatively new species in Louisiana. They are somewhat out of their range, and probably will have only limited use here. The variety big trefoil grew very well during the rainy season but subsided soon after dry weather began. In Louisiana it may be of value for growing near the tideland marshes on land not sufficiently well drained for white clover.

Grass for Winter Grazing

Certain strains of tall fescue were superior to the other species, varieties, and strains included in a test with 30 entries. From the results of two forage harvests made in May and June, five strains of fescue—Glasgow, Kentucky 42, Alta, Justice, and Argus—were superior to all other species and varieties included. They were significantly better than Kentucky 31 fescue.

Kentucky 31 and Alta fescue have both been grown in comparative yield trials at Baton Rouge during the past three years. Each of these strains has continued to live and act as perennials. However, neither has produced any appreciable amount of growth after early June or before cool weather begins in the fall.

—C. L. MONDART, JR., AND C. R. OWEN.

Microorganisms Involved in Nitrogen Transformations in Soils

Experiments with sugar cane and rice in Louisiana have shown that expected increases in yield have not been obtained from the use of organic matter and crop residues in the present cropping systems. A study of the microorganisms and mechanisms involved in the nitrogen transformations in soils where these crops are grown has been initiated.

Organisms capable of growing on a relatively nitrogen-free medium at low oxygen tension (about 2 per cent) have been isolated from Crowley silt loam soil that had been used for growing rice. The organism found capable of growing under these conditions in the laboratory included three species of *Clostridium*, one of *Urobacillus*, a light-gray actinomycete as yet unidentified, *Bacillus polymyxa*, and an alga, *Volvox globator*. Later an orange-red, pigment-forming organism, *Clostridium roseum*,

was isolated under similar conditions from a culture of blue-green algae.

In nitrogen fixation tests in sterilized samples of Crowley silt loam soil kept flooded with water for a four-month period, the organic matter of the soil as an energy source was compared with added glucose, 2 per cent, and ground rice straw, 0.5 per cent. *Bacillus polymyxa* fixed 3.2 mgm. of nitrogen per 100 grams of soil using the soil organic matter as an energy source and 2.0 mgm. using glucose. The *Clostridia* fixed only about 1.0 mgm. of nitrogen using either glucose or soil organic matter. Where straw was added with the *Clostridia*, 1.4 mgm. of nitrogen were lost per 100 grams of soil. No nitrogen was fixed with any energy source by the alga or the actinomycete. In the soil inoculated with *Volvox globator* losses in nitrogen of 1.0 and 3.9 mgm. occurred with the soil organic matter and glucose, respectively. No change occurred where straw was added. A loss of 1.1 mgm. of nitrogen occurred in the soil inoculated with the actinomycete where no energy source was added to the soil.

Rice has been grown in a culture solution without nitrogen, that was solidified with agar and inoculated with organisms isolated from the soil. Generally better growth of the rice occurred where blue-green algae and a combination of algae and some of the bacteria were inoculated into the medium. Results thus far indicate that there is a relationship existing between the rice plant and some of the microorganisms that is beneficial to the plant.

The bacteria and an actinomycete isolated from Crowley silt loam on nitrogen-free medium were tested for nitrate reduction to ammonia in glucose-nitrate solution cultures. Ammonia was produced by all the organisms with the exception of the *Urobacillus*. The largest quantity of ammonia was produced by the actinomycete.--W. H. WILLIS.

Oat Research

Oat research at the Baton Rouge station has been primarily a breeding project involving the development and observation of new material and selection within the newer strains over a period of several years. At the present time disease threatens to be the greatest hazard to oat production in Louisiana and it is reported to be reducing yields materially not only in other sections of the South but in the Corn Belt as well. The presence of *Helminthosporium* blight in Louisiana during the past few years suggested a shift in the varieties being grown commercially from those of Victoria parentage. This disease practically eliminated susceptible strains at Baton Rouge in 1948 and in 1949, while yields in North Louisiana were not seriously affected. The appearance of crown or leaf rust, reported to be race 45 or similar races, on oat varieties of Bond parentage including Camellia and other Louisiana strains has become more prevalent at Baton Rouge; however, the seed yields have not as yet been materially reduced. Furthermore, stem rust has caused more damage recently than in former years. There

was but little loss from this disease in 1949, however. Fortunately smut has not seriously affected adapted Louisiana varieties of oats.

Varieties of Victoria parentage thought to carry genes for susceptibility to *Helminthosporium* blight include Victorgrain, Fulgrain,



Top picture: *Helminthosporium* blight practically eliminated susceptible strains of oats at Baton Rouge in 1949. Below: The Camellia oat, developed and released by the Louisiana Agricultural Experiment Station, has shown resistance to blight.

Fultex, Stanton, Ranger, Traveler, Letoria, Lega, DeSoto, and others. Louisiana farmers should use caution in the selection of varieties for seeding that are known to be resistant to blight.

Outstanding among the blight resistant oat varieties of Bond parentage were the Camellia, Benton and Clinton. A Louisiana Experiment Station selection of Alber was released a few years ago and is one of the best red rustproof types for South Louisiana. The Benton and Clinton varieties do not appear to be adapted to Louisiana conditions. A reselection was made in 1947 of the Alber oats as well as several Camellia lines and other Louisiana strains. The progeny of some of these selections is being increased in 1950.

The Camellia and Alber varieties have a tendency to lodge when heavy applications of nitrogen are made or when they are grown on soils fairly high in nitrogen. As would be expected, higher yields are usually produced under these conditions, but combining is made more difficult and a greater amount of seed may be lost. Saving the crop becomes more hazardous during a wet season with occasional rain and wind storms occurring as the crop approaches maturity. The application of a complete fertilizer before seeding plus a light application of nitrogen in the spring, if needed, would appear more preferable. This method of applying needed fertilizer has been satisfactory at Baton Rouge.—JOHN GRAY.

Experiments With Minor Elements

For the past four years experiments have been conducted to determine responses of plants to minor element fertilization of Louisiana soils. Applications of zinc, copper, boron, manganese, iron, molybdenum, sulfur and magnesium have been made with additions of major elements and with or without lime. Fifteen pounds of soil have been put in 2-gallon, glazed, stoneware pots and the fertilizers and lime thoroughly mixed with the soil in the pots. Soybeans, lespedeza, red clover, white clover and cotton as indicator plants were grown in the pots under greenhouse conditions, and after a substantial amount of growth the plants were harvested and the dry weights determined.

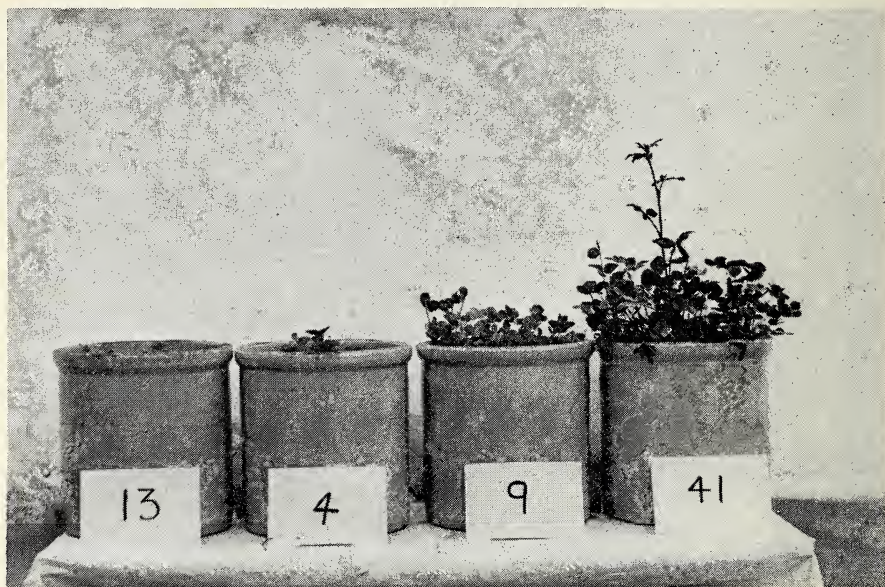
Cotton grown on Ruston loamy fine sand from the North Louisiana Hill Land Experiment Station at Homer, showed a highly significant increase in yield from the use of 5 pounds of borax per acre when added with 1000 pounds of dolomitic lime and 800 pounds of 8-8-8 fertilizer. A highly significant increase in yield was also obtained from the use of 320 pounds of sulfur added with 1000 pounds of dolomitic lime and 800 pounds of 8-8-8 fertilizer.

Soybeans on Ruston loamy fine sand gave a highly significant increase in yield from the use of 25 pounds of 3-12-12 fertilizer. Esminel is a commercial mixture of minerals containing 7.81% Cu O, 18.41% Mn O, 4.46% Zn O, 2.85% Fe₂O₃ and 0.54% B₂O₃. Increases in yield signi-

fificant at the 5% level were obtained from the use of 3 pounds of borax or 160 pounds of sulfur added with the lime and fertilizer.

Lespedeza grown on Memphis silt loam from Weyanoke, Louisiana showed a highly significant increase in yield from the use of 50 pounds of esminel when added with 1000 pounds of 3-12-12 fertilizer per acre. A significant but smaller increase in yield resulted from the use of zinc, copper, boron, molybdenum, iron and manganese added with 3-12-12 fertilizer. These are the same minor elements that are contained in the commercial mixture esminel except that esminel does not contain molybdenum.

Table 1 gives a summary of the results obtained from minor element fertility studies for the past three years. Highly significant increases in yield are shown from the use of one or more of the minor elements for every soil and crop used with the exception of the Mississippi alluvial soil, which is an inherently fertile soil. Deficiency symp-



Red clover on Oberlin silt loam from Oberlin, Louisiana. No. 13 — check; No. 4 — NPK; No. 9 — NPK and dolomitic lime; No. 41 — NPK and dolomitic lime with copper, zinc and boron.

toms on the plants have been negligible even though large increases are shown from the use of minor elements. Before making any general recommendations for the use of minor elements, these greenhouse indications should first be substantiated by similar results from field tests. Also, an attempt should be made to correlate responses of these minor elements to the amounts of these elements found to occur in the soil as shown by chemical laboratory analyses.—C. W. McMICHAEL.

TABLE 1. Summary of Results from Yields of Crops from Treatments of Complete Fertilizer, Lime, Sulphur, and Minor Elements, 1947-1949

Type of soil	Soil area	Crop	Highest yield obtained from use of	REMARKS
Bowie f.s.l.	Coastal plain	soybeans	Zn, Cu, B	Highly significant. 30 lbs. ZnSO ₄ , 25 lbs. CuSO ₄ , 20 lbs. borax added with 4000 lbs. dolomitic lime and 600 lbs. 3-12-12. Some toxicity with 20 lbs. borax. Fertilizer gave highly significant increase over check.
Bowie f.s.l.	Coastal plain	lespedeza	Zn, B	Highly significant, 30 lbs. ZnSO ₄ , 20 lbs. borax added with 3000 pounds dolomitic lime and 600 lbs. 3-12-12. Fertilizer and lime together gave highly significant increase over check.
Oberlin silt loam	Coastal prairie	red clover	Zn, Cu, B	Highly significant. 30 lbs. ZnSO ₄ , 10 lbs. borax, 35 lbs. CuSO ₄ added with 2500 lbs. dolomitic lime and 600 lbs. 3-12-12. Calcic or dolomitic lime gave highly significant increase over fertilized pot.
Sharkey clay	Mississippi alluvial	white clover	no significant differences.	
Robinsonville silty clay	Mississippi alluvial	white clover	NPK	600 lbs. 3-12-12 highly significant on second clipping. There were no significant differences on first clipping.
Ruston l.f.s.	Coastal plain	cotton	S	Highly significant, 320 lbs. sulphur, added with 1000 lbs. dolomitic lime and 800 lbs. 3-12-12. Fertilizer together with lime gave significant increase over check.
Ruston l.f.s.	Coastal plain	cotton	B	5 lbs. borax with lime and fertilizer gave highly significant but smaller yield than S.
Ruston l.f.s.	Coastal plain	soybeans	Esminel	Highly significant over check when 25 lbs. esminel added with 1000 lbs. dolomitic lime and 1000 lbs. 3-12-12 fertilizer.
Memphis silt loam	Mississippi terrace	lespedeza	Esminel	Highly significant. 50 lbs. esminel added with 1000 lbs. 3-12-12. Fertilizer gave a highly significant increase in yield over the check.

Soybean Research

Soybean research at Baton Rouge has been primarily a breeding program involving the development and observation of promising strains over a period of several years. Despite the fact that severe discarding has been practiced annually, a considerable amount of material has been accumulated. Since many of the strains maturing early in the fall have practically failed to produce viable seed during some years, much of the present material showing promise consists of strains maturing late in October or in early November. The climatic and resultant conditions prevailing in South Louisiana are not, at times, optimum for seed production with varieties maturing during August and early September.

The chief objective in the breeding program since 1929 has been the development of varieties producing high yields of forage, together with a satisfactory yield of yellow seed acceptable for crushing. Late maturing varieties have usually yielded more forage than have early maturing varieties. A large portion of the Louisiana soybean acreage has been utilized for soil improvement. The green forage has been turned under in the cane area, while in other sections of the state soybeans were often interplanted with corn and usually were not harvested for seed, but the entire crop was turned under after the corn had been harvested. Varieties producing high yields of forage have been required for the cane area, while medium late maturing varieties producing sufficient forage to hold grass and weed growth in check throughout the season and also capable of producing ample seed for planting the following year have been satisfactory for interplanting with corn.

The seed requirement of soybean varieties adapted to soil improvement in Louisiana has varied but little during the past 20 years. During the past several years seed production of these varieties has not been adequate to supply the demand for planting in the state. Substitute varieties were grown for a time in the cane area with varying results. The Louisiana Agricultural Experiment Station developed and released the Pelican and Acadian varieties which have proven to be well adapted for general use in Louisiana.

A reselection was made in 1947 of some of the Louisiana strains at Baton Rouge. Some 3400 selections were grown and evaluated in 1948. Two hundred and fifty of these selections were grown in replicated 2-row field plots 100 feet long in 1949. The yields from the progeny of many of the 1947 reselections were several bushels higher than the 1944-1948 average performance of the original Louisiana strains. The average increase in the 1949 yields over the previous years may be attributed in part to somewhat more favorable growing conditions and to better cultural treatments which included the application before planting on June 3-4 of 600 pounds per acre of 3-12-12 fertilizer. However, some of the selections within the different strains appeared relatively superior in 1949.

Promising new strains included the Louisiana 41-1219, Louisiana 40-388, Louisiana 41-1201, Louisiana 41-1152 and the Louisiana 38 series. Louisiana 85697 and Nanksoy, which has been grown as Texas, are earlier in maturity and have shown some promise. The Louisiana selection of the P. I. 85897 include several different types of plant growth and seed size and are well adapted to combine harvesting.

—JOHN GRAY.

Release of Louisiana 41-1219 Soybeans

The Louisiana 41-1219 variety of soybeans was developed by the Louisiana Agricultural Experiment Station. It is a selection from Tanloxi x P. I. 60406. This variety produces sufficient tonnage for the cane area and other sections of the state where high yields of forage are required for soil improvement and for hay. The plants are viny to semi-viny in habit of growth and provide sufficient cover to hold other vegetation in check during the entire summer.

Seed yields of approximately twenty-six bushels per acre have been obtained in tests at the Baton Rouge station since 1944. The yellow seed is high in oil and in protein. The 1949 analysis showed 21.3 per cent of oil and 43.2 per cent of protein on a moisture-free basis. The iodine number of the oil, which is an indication of the drying quality, was relatively high in the same analysis, being 135.6. The seeds are of medium size (approximately 4,000 to the pound), straw yellow with an outstanding brown hilum, and somewhat ellipsoidal in shape. The two to three seeded pods are golden yellow and are highly resistant to shattering. The pubescence is tawny and the flowers are purple.

The commercial quality of the seed is good; however, this variety has a tendency to produce some rather small seed under adverse growing conditions. The outstanding brown hilum was selected as a possible aid in identification in later seed certification of purity. A few bushels of La. 41-1219 soybeans will be released to farmers for increase in 1950.

Previous releases of the Louisiana Agricultural Experiment Station include the Acadian and Pelican varieties. The Acadian (La. 40-290) is a selection from P. I. 60406 x P. I. 04910. It is similar to the La. 41-1219 in the production of seed and forage, seed analysis, maturity and in general appearance except that the hilum is more of a tan brown and is not as conspicuous as is the hilum of the La. 41-1219. The Pelican (La. 38-40) was an earlier selection of Tanloxi x P. I. 60406. It was selected as a forage variety and is not as high in oil content (18.9 per cent) but is somewhat higher in protein content (44.2 per cent) than the other two varieties. The seed of the Pelican may be distinguished from that of the other two varieties by its black hilum.

The La. 41-1219 soybeans mature about November 1 at Baton Rouge regardless of the date of planting to July; however, the forage production is reduced when planting is made after about June 1. Satisfactory seed yields have been obtained from plantings made during April through early June. They may be planted immediately fol-



The Louisiana 41-1219 soybean produces high yields of forage and satisfactory yields of seed suitable for crushing. The 1949 increase plot was planted May 31.

lowing the harvesting of oats if ample moisture is present in the soil. Date of planting tests at the Baton Rouge station have shown that late planting of late maturing varieties facilitated combining since the soybean stalks were smaller in diameter and had a tendency to grow more upright than was the case when planting was made early in the season —JOHN GRAY.

Effects of Fertilizers and Lime on the Yield of Soybean Seed

Fair yields of soybeans have been made at Baton Rouge on soils considered inadequate for the production of other farm crops without fertilization. Fertilizer tests in 1941 failed to show significant gains when rather low rates of fertilizer applications were made. On soils seriously deficient in available plant nutrients the soybean crop would need to be supplied to maturity; consequently, higher rates of application appeared necessary for maximum yields. Actually in most cases more than the total nutrient content of the plant at maturity would need to be supplied, since the plant is not capable of recovering all of the fertilizer applied. Higher amounts of plant food were applied in the 1948 and 1949 tests than were used in the 1941 test. Nitrogen was applied at the rate of 24 pounds per acre, P_2O_5 at rates from 36 to 72 pounds, and K_2O at rates from 48 to 72 pounds. One half of each plot received dolomitic limestone at the rate of $1\frac{1}{2}$ tons per acre.

Fertilizers in all combinations increased the yields of soybean seed on Olivier silt loam at the Essen Lane farm at Baton Rouge in 1948

and in 1949. The test definitely showed an increase in yield from liming and from phosphate and potash applications. An application of



Effect of Fertilizers and Lime on the Yield of Soybean Seed.

Top picture: An application of 72 pounds of P_2O_5 increased the average yield 5.2 bushels per acre. A further increase of approximately 5 bushels per acre was obtained when 72 pounds of K_2O were added with the phosphate application. The 0-72-72 application yielded 31.4 bushels per acre in 1949. Bottom: The plants grown on the untreated plots were more erect and semi-viny and their stems were smaller, which made combining easier and yields lower.

72 pounds of P_2O_5 increased the average yield 5.2 bushels per acre. A further increase of approximately 5 bushels per acre was obtained when 72 pounds of K_2O were added to the phosphate application.

A consistent increase in yield was obtained from the use of lime for the two-year period. The increase from an application of $1\frac{1}{2}$ tons of dolomitic limestone with 36 pounds of P_2O_5 and 48 pounds of K_2O per acre averaged 7.4 bushels. Of this increase 4.6 bushels were from lime.

The type of plant growth varied markedly on the plots receiving the heavier fertilizer applications when compared with those receiving none. The plants grown on the plots not fertilized were more erect and semi-viny, averaging 53 inches in height, while those on the fertilized plots were lodged and viny, averaging 68 inches in length with the higher rates of fertilizer application.

The greater vegetative growth made with the more favorable nutrient supply was further reflected in the size of the soybean stalks. Stalks from the 24-72-72 fertilizer plots yielding approximately 10 bushels per acre more were also twice the diameter of those grown on the plots not fertilized. Obviously the unfertilized plots were more easily combined but their yields were lower.

Recommendations: Lime to pH 6.2 to 6.5 and apply 400 to 600 pounds of a 3-12-12 fertilizer. Plant and secure good stands of soybean varieties having high yield potentialities. Cultivate efficiently and early. Be prepared to dust for caterpillar.—JOHN GRAY AND M. B. STURGIS.

A Soil Survey and Study of the Soils of St. Mary Parish

In order to obtain more detailed information for experimental uses a soil survey was started in December of 1948. This is a complete physical inventory of all the soils on each farm and plantation. This inventory includes the soil texture, soil color, depth of soil, slope of land, degree of soil drainage, crop yields and other important observable physiographical, physical and chemical features. These factors are observed in the field by soil surveyors. From this information the soil series and types are named, and the information recorded on maps.

This soil survey is a cooperative program with the United States Department of Agriculture, Bureau of Plant Industry, Division of Soil Survey. The names of the soils as classified and mapped by the soil surveyors are correlated in accordance with the standards of the United States Department of Agriculture, Bureau of Plant Industry.

St. Mary Parish was selected for this project and two surveyors are now in the field mapping soils. Approximately 30,000 acres have been mapped to date. This parish has an area of 605 square miles and is one of the coastal parishes of southern Louisiana. Sugar cane is the most important crop, and this is one of the largest sugar cane producing areas in the state. The cultivated area of the parish is nearly level, with the exception of the gently sloping land along Bayou Teche.

Most of the soils area of St. Mary Parish, excluding the marsh and swamp lands, is represented by soils somewhat older than the Missis-

Mississippi River bottom land soils west of Atchafalaya River. There is more difference in the various layers of soil that make up the soil profile than is found in profiles of the recent Mississippi River bottom lands. The tillable soils of St. Mary Parish represent natural levee deposits of an older distributary of the Mississippi or Red rivers during the time it followed the course now occupied by Bayou Teche.

The important soil series correlated in St. Mary Parish together with their readily observable soil problems, are as follows:

1. Sandy deposits at the highest part of this natural levee are represented by soils of Cypremort series. These soils are predominantly sandy throughout and display but little soil profile differentiation. Because they are not capable of holding moisture as well as the heavier textured soils, crops suffer from drought during extended dry periods. They are more leached than the heavier textured soils, and applications of lime have proved beneficial for some crops.

2. Silt and clay deposits on the edges of the natural levee covered areas of swamp and marsh high in organic matter to various depths. Areas of these heavy lands high in organic matter are represented by the soils of the Iberia series. These soils in general are heavy textured with slow sub-surface drainage and low surface runoff. Complete drainage systems are necessary for profitable cultivation.

3. Silt and fine sand deposits in former shallow coastal lakes high in organic matter are represented by the soils of the Jeanerette series. These soils have a high natural fertility, but occur on level areas which need drainage for the production of high yields.

4. Silt loams, loam, and silty clay deposits over heavy clays at shallow depths represent the mixed land soils of the Baldwin series. These soils have heavy subsoil layers at shallow depths and occur on flat or nearly flat areas. Adequate drainage is necessary for profitable cultivation.

5. In western St. Mary Parish there are a few low ridges of soils developed on the Pleistocene Prairie terrace. These are the claypan soils of the Patoutville series. They have heavy, slowly permeable claypan horizons at shallow depths below the surface. Both drainage and soil fertility are problems on this land.

6. The gentle slopes bordering Bayou Teche have a deposit of mixed sediments usually having a reddish-brown or red color. These are soils of the Buxin series. They are deposits of material carried from the Permian Red Bed areas and deposited when Bayou Teche carried sediments of the Red River. These soils, in general, are fertile, but owing to the slopes on which they occur, have suffered moderate to very severe losses of top soil and plant nutrients.

7. Gray heavy clay soils with poor drainage are represented by the Alligator series. These soils occur in swamp and swamp border areas. When not in cultivation, they are under water a large part of the year. These soils produce moderate to good yields of sugar cane

when adequately drained, and under weather conditions favorable for cultivation and harvest.

In cooperation with the soils survey of St. Mary Parish, C. E. Scarsbrook is conducting experimental studies on the permeability and structure of some of the heavy soils. A study by D. N. Driskell of the soil minerals of the different soil series is in progress. This study is to determine the source and particular characteristics of the soil materials which make up these soils. Total analyses will also be made. The data are to be used in the correlation of the soil series.

When the soil survey and studies are completed, all information obtained will be published in a report of the United States Department of Agriculture, Bureau of Plant Industry. This report will include a complete detailed soil map of St. Mary Parish, chemical analyses of the soils, and soil management and fertilizer recommendations.

—S. A. LYTLE AND B. F. GRAFTON.

Mixed Fertilizer Formulation Studies and Toxicity of Corrosion Inhibitors and Soluble Aluminum in Mixed Fertilizers

A study has been made to determine the effects of urea-form, conditioned ammonium nitrate, sludge acid ammonium sulfate, ammoniated lignite and raw lignite in 8-8-8 mixtures on the growth of cotton. A field test involving these materials was conducted on Olivier silt loam. The test was set up with a check and nine treatments in randomized complete blocks replicated four times. Muriate of potash and superphosphate were common carriers in all treatments. Also, in all treatments 3 per cent of the nitrogen was from a nitrogen solution.

The yield data from the experiment did not show any significant differences between the treatments. Differences might have been obtained had not excessive rainfall during the fruiting and harvest season brought the yields down to about half the normal yield for the area. The highest yield, which was 107 pounds per acre higher than the check, was obtained from the mixture containing ammoniated lignite. Although there was no significant statistical difference, the yield data together from field observations indicate that ammoniated lignite holds promise as a source of nitrogen.

A field test was conducted on Olivier silt loam to determine whether or not the use of corrosion inhibitors and the presence of soluble aluminum in nitrogen solution used in the manufacture of mixed fertilizers and ammonium sulfate manufactured from refinery sludge acid have any toxic effect on the growth of cotton.

The test was set up with a check and 13 treatments in a randomized complete block replicated four times. All plots received 600 pounds of 8-8-8 fertilizer per acre. In one treatment sludge acid ammonium sulfate was used. The fertilizer for all the other treatments carrying inhibitors and soluble aluminum including the check were made up with 5 per cent nitrogen from ammonium sulfate and 3 per cent from

nitrogen solution. The corrosion inhibitors and the amounts in the solution used in the various treatments are as follows: Ammonium thiocyanate 0.2 per cent, sodium arsenite 0.2 per cent, sodium thiosulfate 0.2 per cent, benzoisothiouraea 0.2 per cent, amyl mercaptan 0.2 per cent, nacap 0.2 per cent, caustic wash (raw) 0.6 per cent, B-mercapto ethanol 0.2 per cent, and B-mercapto ethanol and sodium arsenite 0.1 per cent each. Soluble aluminum was added to the nitrogen solution used in making up three treatments in 100, 500 and 1000 parts per million amounts.

Signs of toxic action by the various materials were not apparent in the growth of cotton, and statistical analysis of the yield data did not show any differences which were significant. On sandy soils which are less buffered than Olivier silt loam the presence of some of these materials may prove toxic. At the present time work is underway to test that possibility.

A test was also conducted in the greenhouse with cotton on Olivier silt loam using the same materials as a further check on the possibility of toxicity. The fertilizer in this test was applied at the rate of 1000 pounds per acre. As in the field, observations and yield data did not show any case of toxicity.

The same test was duplicated in the greenhouse using tomatoes as the indicator plant on the same soil type. Again observations and yield data did not show any case of toxicity. After the tomatoes were harvested the same pots were planted to soybeans without further treatment to the soil. The soybeans showed normal growth in all treatments.—RICHARD L. ARCENEUX.

Dairy Research

Concrete vs. Elevated Wire Floor in Raising Calves Up to 4 Months of Age

Statistics published by the U. S. Department of Agriculture reveal that the mortality rate of dairy calves is something over 25 per cent for the nation. Investigations have shown that common scours and pneumonia, during the early life of the calf, are primarily responsible for this high mortality rate. With artificial breeding well underway in the state, better calves are being dropped. This makes it more important that the farmer be supplied with information on better management practices of raising these calves for his herd replacements.

This investigation was set up to study the effect of type of floor on the health of the calf, i. e. in preventing common scours and pneumonia; and to observe the rate of growth and vigor of the calf.

Twenty Jersey and Holstein calves of the University Dairy Farm were used in the following groups: Group I, concrete floor with shavings; Group II, elevated wire floor with shavings; and Group III, elevated wire floor without shavings. All calves were fed alike according to recognized feeding standards.

The average daily gains for Jersey and Holstein calves for this first trial are given in Table 1.

TABLE 1. Average Daily Gain of Jersey and Holstein Calves in Each Group

Group	Jerseys	Holsteins
	lbs.	lbs.
I	.780	.850*
II	.840	.922
III	.755	.967

*Only one Holstein.

There was no apparent difference between the various groups as to rate of growth and health. It appears that cleanliness, particularly dry bedding, rather than type of floor is a most important factor in raising healthy and vigorous calves. This study will be continued with a large number of calves.

—B. J. BURCH, JR., J. B. FRYE, JR., AND PAUL HENDERSON.

Curing Cheese In a CO₂ Atmosphere May Help Control Mold Growth on Surface

Southern cheese manufacturers experience considerable difficulties with heavy mold growth on the surface of cheese during the curing process. Moldy surfaces cause unsightly appearance of cheese, and this naturally can, and usually does, affect its market value.

Although Louisiana is not a cheese producing state, one plant in the Baton Rouge area manufactures a considerable quantity of cheddar

cheese, and several smaller plants in various parts of the state manufacture some cheddar cheese from time to time. At the rate that dairying is developing in Louisiana it is very possible that cheese manufacturing might some day become an important industry.

Preliminary trials with cheddar cheese cured in CO₂ atmosphere are showing promising results. The surface of cheese cured at 45° F. in CO₂ remains bright and clean and shows little or no rind formation. The evaporation of moisture from the surface is retarded in the CO₂ cheese, a point which might prove very significant economically because cheese cured under usual conditions will lose weight from loss of moisture. No significant difference in the bacterial flora of the interior of the cheese has been found so far (4 months), which might indicate that a CO₂ atmosphere should not interfere with the normal ripening process. A check on the course of proteolysis is being made by periodically determining the rate of water soluble nitrogen formation. This, along with organoleptic tests, will serve as guides for the rate of curing. —A. J. GELPI, JR., AND S. A. KALOYEREAS.

Feeding Value of Dehydrated Sweet Potatoes As Compared to Silage for Lactating Cows

During the winter months when pastures may be poor or unavailable, silage becomes an important part of the cow's ration. Some farms have herds too small for practical silage feeding and therefore a suitable home-grown substitute is desirable. Can dehydrated sweet potatoes (fed wet) replace silage in the dairy ration?

Using a latin-square design, 3 groups of 8 dairy cows each, consisting of 5 Holsteins and 3 Jerseys, were given a good grain mixture according to production. Approximately 8 lbs. of alfalfa hay per cow per day, and equal amounts on an air-dry basis of either silage, or dehydrated standard sweet potatoes wet with an equal weight of water, or dehydrated weevil-infested sweet potatoes wet with water were fed for 20 days.

Chemical analyses of corn-soybean silage and dehydrated sweet potatoes (air-dry basis) are given in Table 1.

TABLE 1. Chemical Composition of Corn-Soybean Silage and Dehydrated Sweet Potatoes (air-dry basis)

Product	Protein	Fat	N.F.E.	Fiber	Ash	Calcium	Phosphorus
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Silage	5.26	1.1	55.49	3.09	7.25	0.35	0.30
Standard potatoes	5.00	.35	79.29	3.77	2.93	0.07	0.14
Weevil-infested potatoes	5.31	.43	77.21	3.82	3.58	0.12	0.17

The average amount of 4 per cent fat-corrected milk per cow per day produced by each group on the following feeds was as follows:

TABLE 2. Pounds of 4% Fat-Corrected Milk per Cow per day

Group	On corn-soybean silage	On dehydrated standard sweet potatoes	On dehydrated weevil-infested sweet potatoes
A	24.0	25.2	27.3
B	24.1	26.6	26.5
C	25.3	25.2	24.7
Average	24.4	25.6	26.1

There was no significant difference in the milk production between the various groups on either silage or dehydrated sweet potatoes fed wet. No evidence of digestive disturbances was observed in any of the groups. Therefore, it would appear from these data that dehydrated sweet potatoes fed wet could serve as a good substitute for silage.—L. L. RUSOFF, B. J. BURCH, JR., J. B. FRYE, JR., AND G. D. MILLER.

Level of Animal Protein in Calf Starters

This study concerns the development of an economical grain calf starter to be fed calves that are weaned from whole milk at an early age. A 20 per cent digestible protein calf starter containing 5 per cent meat scraps, cottonseed meal, yellow corn meal, rolled oats, wheat bran and minerals was compared with a similar starter containing 15 per cent meat scraps. Two groups of 12 calves each, 3 to 6 days of age, were used and kept in individual pens. Milk was fed at a ratio of 1 pound to 10 pounds of body weight for a period of 4 or 5 weeks by nipple pail or open pail method. The calf starters and lespedeza hay were fed at the end of the first week. Vitamin A in the form of shark liver oil was given daily to each calf after weaning from milk.

At 90 days of age, no significant differences were observed in gains in body weight, height at withers, or grain consumed per pound of gain, between calves fed the 5 or 15 per cent level of animal protein calf starter or between those weaned from whole milk at 28 or 35 days of age.

The gains in weight for the two major groups of calves were considered normal when compared to the Cornell standard of calf gains, even though a slight slump in growth always occurred immediately following the cessation of milk feeding.

The open pail method of milk feeding caused a pot-bellied condition among most of the calves and 57 per cent more nutritional scours than did the nipple pail method. However, at the completion of the experiment there was no significant difference in gains in body weight between calves fed milk by either method.

As high as 35 per cent cottonseed meal in starter rations as a source of protein may be fed successfully to young calves when some animal protein and an adequate vitamin A supplement are supplied.

This experiment showed that Jersey calves could be raised successfully on weaning from whole milk at 28 days of age provided they are

strong and vigorous at birth, encouraged to eat good quality hay and a 20 per cent digestible protein starter containing 5 per cent meat scraps at an early age, and fed a vitamin A supplement upon weaning from milk.—L. L. RUSOFF AND D. L. ESTESS*

Malnutrition Studies With Dairy Cattle

For the past three years, 10 milking cows have been fed a limited amount of low quality native grass hay along with a simple grain ration containing 3 parts yellow corn meal, 1 part cottonseed meal and 1 per cent salt. On this high grain-low hay feed without mineral supplementation the animals have shown symptoms of malnutrition, i. e., stiffness in walking, humped back, and constant tongue licking. A recent symptom has been a depression at the base of the tail. The muscle from the spinal column to the end of the pinbones instead of being firm has become loose.

One theory for this might be the shifting of the position of the bones. Since the ration is low in minerals, the skeletal bones are in a weakened condition and may change position causing the stretched muscle to become loose. The bending of the hind legs might also be explained by the weakened bones due to mineral resorption. Feeding of calcium and phosphorus has had no effect in alleviating this condition.

Milk production, however, appears to have been helped by feeding calcium and vitamin A supplements.—L. L. RUSOFF.

The Effect of Various Kinds of Hay Upon Semen Production and Fertility of Dairy Bulls Used in Artificial Breeding

Alfalfa, lespedeza, and alyce clover hays were compared as sources of roughage for bulls used in artificial breeding. Hay was fed at the rate of one pound per one hundred pounds of body weight and a 14 per cent grain mixture was fed at the rate of five-tenths pound per one hundred pounds body weight.

Semen samples meeting certain quality standards were extended with egg yolk-citrate-sulfanilamide and shipped to breeding technicians in the Louisiana Artificial Breeding Cooperative, Inc., for routine breeding.

Summaries of semen characteristics are given in Table 1.

TABLE 1. Semen Characteristics of Bulls Being Fed Various Kinds of Hay

Treatments	No. Samples	Volume (cc.)	Initial Motility (per cent)	Concentration x 1,000,000	M. B. Reduction Time (min.)	Shippable Ejaculates (per cent)
A	136	3.99	62.4	1,521	5.5	74.3
B	131	3.36	55.2	1,534	5.4	69.5
C	131	4.26	58.3	1,403	55.7	74.0

Treatments: A, alfalfa. B, lespedeza. C, alyce clover-grass mixture.

*Graduate student.

Data presented in Table 2 show the number of first services and the per cent of 60-90 day non-returns. The average per cent non-returns for treatments A, B, and C were 59.65, 59.52, and 55.33, respectively. These data show a slightly lower fertility for bulls in treatment C which were fed a mixture of alyce clover and grass hay. However, these differences were not considered to be important.

TABLE 2. Fertility Data of Bulls Being Fed Various Kinds of Hay

Treatment A		Treatment B		Treatment C	
First Services	Per cent Non-Returns	First Services	Per cent Non-Returns	First Services	Per cent Non-Returns
1,886	59.65	1,529	59.52	1,811	55.33

Data presented indicate that dairy bulls being used in artificial breeding may be fed alfalfa, lespedeza, or alyce clover hay with good results. However, the lespedeza used in this experiment was more palatable and was available at a lower price per ton than either the alfalfa or alyce clover hay.

—T. E. PATRICK, M. H. NEWSOM, AND CECIL BRANTON.

Entomology

Sugar Cane Insect Studies

Ryania as well as Cryolite Recommended For Sugar Cane Borer Control in 1950

The sugar cane borer caused severe damage over a large part of the cane growing area in 1949. The extremely heavy population of overwintered borers in the spring together with favorable conditions for development throughout the season was responsible for an increase and spread of this pest, unequaled in many years. The control program was not extensive enough to hold the insect in check. Consequently, research studies were conducted under conditions of a heavy borer infestation.

In 1949, the insecticidal studies on the sugar cane borer were designed to obtain more data on the effectiveness of new and promising insecticides against this pest; the damage done by second, third and fourth generation borers; the effectiveness of third generation control by airplane application of the poison; the advantages of increased dosages of cryolite under conditions of thick cane growth and a heavy population of borers; and the possibilities of controlling borers in corn with various materials by either hand-gun or plane application.

The relatively new insecticide Ryania showed an outstanding residual effectiveness as compared with cryolite in small plot tests on control of second generation borers. Since it has compared favorably with cryolite over a period of years, 40 or 50 per cent Ryania is recommended in addition to cryolite for the control of the borer in 1950. In preliminary tests, dieldrin (compound 497) and Rothane showed promise.

The damage done by second, third and fourth generation borers and combinations of each was studied in two tests. Under the prevailing conditions second generation damage was far more important than that of later generations. In previous tests, the value of third generation control had been demonstrated under conditions of a light second generation injury and a rather heavy third.

Although the third generation had been successfully controlled by hand-gun application, the results from plane application had been rather disappointing. In extensive tests in four different varieties of cane in 1949, a significant third generation control was obtained in varieties C. P. 29/116 and C. P. 36/105 but not in Co. 290 and C. P. 33/310.

It was found that 10 pounds of cryolite per acre per application by plane was not as effective as 15 or 20 pounds for control of a heavy population of second generation borers in a thick growth of cane. However, 15 pounds was found to be sufficient and more economical.

In hand-gun applications, cryolite, Ryania, toxaphene, benzene hexachloride, and parathion gave a significant control of borers in the

stalks of corn. Dusting was discontinued about the time the ears began to form, and as a result there were no differences between the infestation in the ears in the treated and check plots. Actually, the number of infested ears in the benzene hexachloride plots was nearly double that in the untreated checks. In a plane test, Ryania gave some control in the stalks but not what might be called a commercial control.—A. L. DUGAS, C. E. SMITH AND E. J. CONCIENNE.

Control of Several Soil Insects Affecting Corn

The study of the control of the southern corn rootworm, seed-corn maggot and sand wireworm, which damage corn by attacking the germinating seed and the growing plants, was continued during 1949. One experiment was conducted in each of five localities over the state; however, significant results were obtained in only one of the tests because of adverse weather conditions and lack of insect infestations.

The one good experiment consisted of six treatments namely, five pounds of technical chlordane applied in the soil on land following a winter legume cover crop, and no cover crop; the seed treated with chlordane and planted following winter legumes and no legumes; and checks, no treatments, on land following winter legumes and no legumes. The winter legume planted in this field was Austrian winter pea. The cover crop was turned under February 23 and the corn was planted two days later, February 25. Yields of corn obtained in the different treatments are tabulated below.

<u>Treatment</u>	<u>Yields of corn per acre following</u>	
	<u>Legumes</u>	<u>No legumes</u>
	<u>Bushels</u>	<u>Bushels</u>
5 lb. chlordane per acre in soil	58	56
Seed treated with chlordane	65	52
Check, no treatments	4	35

Observations were that the seed-corn maggot was the principal species involved. A large percentage of the plants were completely destroyed in the check on the land following the winter cover crop, as is evidenced by the very low yield. The damage was severe also in the no-cover-crop check plot; however, it was not severe enough to destroy the stand appreciably. In the latter case, the major damage caused was by the insect weakening the plants. There was little or no damage in any of the insecticidal treated plots.

Nearly always there are heavier infestations of the seed-corn maggot and the southern corn rootworm in lands following a winter cover crop than in similar lands not planted to one of these crops. The old recommendation and practice has been to plant corn extremely early, before March 15, or extremely late, after about May 1, in order to avoid damage by the southern corn rootworm. The seed-corn maggot is usually most troublesome in early spring during cool wet seasons

in lands having an abundance of decaying green organic matter, such as turned-under cover crops.

The results of studies to date indicate that with proper soil treatment or seed treatment for the control of these insects, corn may be planted earlier than heretofore without damage from the seed-corn maggot, or later — between March 15 and May 1 — without damage from the southern corn rootworm. The sand wireworm, which is most troublesome in the sandy, hilly areas of the state, is active and does damage throughout the spring and early summer.

—E. H. FLOYD, C. E. SMITH AND J. C. WEBER.

New Treatment Is Highly Effective for Control of Corn Earworm in Sweet Corn

Experiments conducted during 1949 against the corn earworm in sweet corn showed a new treatment consisting of a 25 per cent oil emulsion carrying a 1 per cent DDT to be highly effective against this insect.

The material, prepared from a tasteless mineral oil and a DDT emulsion, was applied with a knapsack sprayer to the silks. One application of the insecticide made when the majority of the silks were matured or browned on tips, produced an average of 90 per cent of the ears entirely free of earworm damage. Untreated corn in the same tests produced an average of only 20 per cent of the ears free of damage. One-half teaspoonful of spray per ear was found adequate to give complete protection. An over-dose results in an oily off-flavor to the grain.

This treatment when properly used is effective and the method of application practical. The previously recommended treatment for this insect involved the injection in the tips of individual ears of a straight oil containing pyrethrum extract. The old control was effective; however, the method of application was adapted only to home gardens or very small plantings. This new method of treatment can be done on a much larger scale. One man can treat from 3 to 5 acres per day.

More investigations need to be done on the development of a suitable power sprayer for treating larger acreages.

—E. H. FLOYD AND C. E. SMITH.

Chlordane as a Soil Treatment for Control of the Sweet Potato Weevil

Experiments begun in 1948 using chlordane as a soil treatment at planting time were continued in 1949. Experimental plots in 1948 using chlordane in the soil in a field with normal weevil infestation gave practically complete protection of the potatoes from infestation by the sweet potato weevil.

One experiment in 1949 involving the use of 5 pounds chlordane per acre applied in the row just before setting the plants gave promising results. This field was heavily infested with the weevil. Potatoes from the chlordane treated plots were 14 per cent infested with weevils, whereas potatoes from untreated plots in the same test were 35 per cent infested. No effects whatever could be observed on the potato vines in treated plots. The weevil infestation in the vines was approximately equal in treated and untreated plots. No off-flavor in the sweet potato has been noted from the use of chlordane in the soil.

—E. H. FLOYD, C. E. SMITH AND J. C. WEBER.

The Effect of Insecticide Applications Early in the Fruiting Period Upon Boll Weevil Populations and Yield of Cotton

During 1949 two experiments involving approximately 400 acres were conducted to determine the effectiveness of overwintered and first generation boll weevil control as a means of suppressing development of damaging infestations later in the season. In each test one application was made about June 15 for control of overwintered boll weevils and cotton fleahoppers and two additional applications were made between July 1 and July 10 at the time adult boll weevils of the first generation were becoming active. Further applications were delayed until infestations of either boll weevil or bollworm became damaging in the treated plots. At this time a uniform application of insecticide was made to the entire experimental area including the previously untreated check plots. Additional applications were made as needed.

Calcium arsenate alternated with Cal-Nic, 3-5-40 mixture, 20 per cent toxaphene, special calcium arsenate plus 1 per cent gamma isomer benzene hexachloride, special calcium arsenate plus 1 per cent parathion, and a toxaphene-DDT spray concentrate were compared with an untreated check in these tests. All insecticides were of approximately equal effectiveness. The following table shows the effect of the 3-5-40 mixture on boll weevil and bollworm infestations and yields of seed cotton per acre as compared with the check.

Experiment 1			Experiment 2	
Per cent Weevil Infestation			Per cent Weevil Infestation	
Week of:	3-5-40	Check	3-5-40	Check
June 19	6	8	24	24
June 26	2	7	3	12
July 3	1	7	4	24
July 10	2	15	4	31
July 17	2	15	16	46
August 1	9	40	34	55
Percent bolls injured by bollworm Aug. 1.....	10	13	10	4
Yield - seed cotton /A	1919	1531	1775	1868

Control of first generation boll weevils resulted in suppression

of subsequent populations below the level usually considered to be damaging until migration began. However, benefits from such treatment were largely nullified by the destruction of predators and parasites of the bollworm which allowed heavy infestation of this pest to develop. The setting of fruit on comparatively small plants reduced vegetative growth and depressed subsequent fruiting in the treated plots of Experiment 2.

—L. D. NEWSOM, J. S. ROUSSEL, C. E. SMITH, AND T. R. PRIMMER.

The Effect of Aphid Infestations on the Vegetative Growth and Fruiting Behavior of Cotton

The effect of cotton aphid infestation on vegetative growth and fruiting behavior of the cotton plant was studied in the greenhouse during 1948 and 1949. In one experiment the plants were grown in 8-inch clay pots filled with building sand to which was added a sufficient amount of nutrient solution to maintain satisfactory growth. In another the plants were grown directly in the heavily fertilized soil comprising the greenhouse floor. Aphid infestations were introduced from naturally infested plants growing in the field. Populations of



Plants in center row infested with aphids prior to blossoming were greatly reduced in height with a delay in fruiting of about two weeks. After the aphids were removed these plants recovered and yielded as well as uninfested plants. Photographed January 26, 1949.

aphids on the plants comprising the different treatments were maintained at different levels by the use of insecticides.

Infestations prior to the beginning of blossoming seriously stunted the plants and retarded fruiting for a period of two to three weeks. When the aphids were removed from the plants a short time after blossoming began, the infested plants yielded as well as those which were not infested. Infestations allowed to continue unchecked for four weeks or more during the blossoming period reduced the percentage of bolls set and the size of the seed. Other differences which were apparent seven weeks after blossoming began were smoothed out when the plants were allowed to fruit for a period of approximately 14 weeks.



Plant on right infested prior to blossoming. Observe distorted leaves, reduction in height and lack of fruit when compared with uninfested plant at left. Photographed January 26, 1949.

soms the infested plants shed a much higher percentage of bolls and produced smaller seed than plants which were not infested.

—T. R. PRIMMER, L. D. NEWSOM AND C. E. SMITH.

Relation of Boll Set to Blossoming Date

There is a widespread belief among Louisiana cotton growers that cotton will not set fruit during August. An experiment conducted during 1949 to study the effect of aphid infestations on growth of the cotton plant afforded an opportunity to determine the exact time during the growing season when the fruit was set.

In this study seed of the variety Louisiana 33 was planted April 25 in a plot of well-fertilized soil at the Red River Valley Experiment Station. The plants received two applications of DDT during June for control of the cotton fleahopper. Other insecticide applications were

made during the season as needed for boll weevil and bollworm control. All blossoms produced on each of 250 plants were tagged with dated tags at daily intervals from July 12, when blossoming started, until September 3. At picking time the attached tags allowed the exact date of blossoming to be established for each boll which matured. The following table shows the percentage of total crop set from blossoms produced during each week of the fruiting period.

<u>Week ending</u>		<u>Per cent of total crop set</u>
July	10	8.8
July	23	16.6
July	30	17.7
August	6	24.1
August	13	7.0
August	20	7.6
August	27	9.4
September	3	8.8
Average number of bolls matured per plant		16.5

Under the conditions of this test over 50 per cent of the entire crop produced developed from blossoms occurring after August 1. These data emphasize the importance of insecticide application late in the growing season when boll weevil populations are heaviest.

—L. D. NEWSOM, T. R. PRIMMER, J. S. ROUSSEL, AND C. E. SMITH.

Thrips as Pests of Seedling Cotton

A study of thrips as pests of seedling cotton was continued during 1949. This study confirmed findings of previous years that the tobacco thrips is responsible for practically all of the insect damage to seedling cotton in Louisiana. Important winter host plants of this species were found to be white clover, crimson clover, bur clover, alfalfa, and oats. Heavy populations of thrips develop on these crops and



Plants left of alleyway treated for thrips control, those on the right untreated. Photographed June 9, 1949, Homer, Louisiana.

migrate to cotton as soon as the seedlings emerge from the soil. Seedling plants may be infested before the seed coat is pushed off the cotyledons, and the thrips usually remain on the plant and continue to do damage until early June. Injury results in reduction in amount of leaf surface, decreased height, excessive branching of the main stem, and delay in maturity. Such effects are usually outgrown by the end of the growing season.

Tests at Homer, Calhoun, and St. Joseph showed that thrips injury was responsible for a reduction in height of stem of as much as 30 per cent in the variety Deltapine 15 when measured during the first week in June. The same plants measured at the end of the growing season were as tall as comparable plants which had been treated for thrips control. Although yield at the date of first picking was reduced by thrips injury, final yields at Homer and St. Joseph showed a slight increase for plots which were not treated for thrips control. This decrease was probably due to a depressing effect on subsequent fruiting caused by the early setting of bolls on comparatively small plants. At Calhoun final yield as well as yield at the date of first picking was decreased where thrips were not controlled. Thrips injury at the Calhoun station resulted in decreases in yield ranging from 6 to 19 per cent.

The varieties Empire, Deltapine 15, Coker 100 W R, Louisiana 33, Stoneville 2B, and Delfos 9169 were included in these tests to determine if there were any differences in varietal susceptibility to thrips. Deltapine 15 was consistently more severely affected and Empire least affected, followed closely by Stoneville 2B. Other varieties were intermediate between these.

—L. D. NEWSOM, C. E. SMITH, T. R. PFRIMMER, C. B. HADDON,
D. M. JOHNS AND R. S. WOODWARD.

A Potentially Serious Pest on Winter Legumes

A large purplish-red spider mite, which has not been given a distinguishing common name but is known scientifically as *Tetranychina apicalis* Banks, apparently is becoming a serious pest on several winter-growing legumes in Louisiana, according to observations and studies made during 1949. The crops observed being attacked most commonly are Singletary pea, white clover, hop clover, crimson clover and common vetch. Damage is most severe in fields or on pasture lands where one or more of these crops have been grown several years in succession.

The seasonal habits of this spider mite are correlated closely with those of its host crops, namely, active stages are present in the field during the cool period of the year when host crops are growing, and present in the inactive quiescent egg stage during the summer months when few or no host crops are growing. This habit is a very important factor in, and conducive to, the building-up of destructive populations in fields or on pasture lands where host crops are grown several years in succession.

CONTROL: Tests on the control of this spider mite have been limited in scope and were conducted mostly after the weather had warmed up in the spring. The results obtained indicate that a one per cent DN (Dinitro-o-Cyclohexylphenol) in sulphur will control the species effectively. —C. E. SMITH.

Insecticide Testing Laboratory

The synthesis and distribution of a large number of new insecticides in recent years has increased the need for a screening and testing laboratory to augment the usual field insecticidal research and testing conducted by the Department of Entomology. With the aid of a research grant from the Ethyl Corporation, work was begun on a testing laboratory in October of 1948.

Such a laboratory when fully equipped will serve to evaluate household insecticidal materials and agricultural dusts and sprays. More specifically, it will be a means of obtaining preliminary data on toxicity of the newly developed insecticides to the various insects with which we are concerned and of determining the approximate concentration of new materials that would be needed in the field or household for control of specific insects. Preliminary field testing is expensive and time consuming. It will also be a significant contribution to the Department of Entomology, both academic and research, in offering graduate students an opportunity to work out theses problems.

Although a large part of the time, thought, and effort expended the first year was toward development of equipment and facilities, progress was also made in developing techniques for rearing test insects and the growing of food and test plants, and in techniques for testing insecticides against certain insects.

—A. L. DUGAS, C. E. SMITH AND DAN CLOWER.

Residue From Fog Machine Effective One Month in Building

A building treated experimentally with a fogging machine using chlordane as the toxicant retained its toxic residue for approximately one month. The toxic action of the residue was highly effective against cockroaches the first two weeks, at the end of which time the effectiveness of the residue was gradually reduced. After 45 days the toxicity had practically disappeared. It was found that the fog was quite effective in cleaning a house of insect life during the time of actual exposure. Houseflies, silverfish and cockroaches were all dead 48 hours after the house was fogged. It was not effective against the rice weevil and flour beetles.

Additional tests in exposed cages conducted following the treatment showed that a toxic residue from the fog treatment is deposited on all flat and un-obstructed surfaces. Within a room this means a toxic deposit will be obtained on the floor, table tops, etc., but not on the ceiling or walls. —C. E. SMITH AND E. H. FLOYD.

Fertilizer and Feedstuffs Laboratory

Activities of the Laboratory

The past year has seen a marked increase in the activities of the laboratory. Official samples analyzed for the State Department of Agriculture increased to 3875. These samples were run as a check on manufacturers of feedstuffs, fertilizers, and economic poisons. Because of this type of checking the quality of these commodities is maintained and farmers may buy with confidence.

Though the primary function of the laboratory is to make analyses as above, 800 samples were analyzed last year for other departments of the Experiment Station and for people of the state. These analyses were concerned with such materials as silage, mixed feeds, fertilizers, insecticides, herbicides, limestone, range forage, water, etc.

A special program in cooperation with the State Department of Agriculture has been concerned with removal of insecticide residues from sweet potatoes. A total of 266 analyses have shown that when 10 per cent DDT dust is used, proper washing will maintain the DDT residue at less than five parts per million.

Various of the laboratory personnel carried on research on analytical methods for nitrate fertilizers, potash in fertilizers, crude fibre in feeds, 2,4-D, and benzene hexachloride in collaboration with the Association of Official Agricultural Chemists. —E. A. EPPS.

Forestry

Experimental and Demonstrational Tree Planting In Washington Parish, Louisiana

During the year 1949 an experimental planting was made at the Southeast Louisiana Livestock Experiment Station farm near Franklinton. Considering the conditions that have existed in the field, survival and growth of the seedlings have been all that could be expected.

During January and February of 1949 a total of 9.5 acres were planted as follows:

1. Two one-acre plots in loblolly pine.
2. Two one-acre plots in slash pines.
3. Two one-acre plots in a 3-row mixture containing loblolly and slash pines
4. Remaining area of 3.5 acres in isolation strips between test plots.

The loblolly pine seedlings were grown in the L. S. U. School of Forestry Tree Nursery and were of Livingston Parish seed origin. Slash pine seedlings were obtained from the Louisiana Forestry Commission nursery at Oberlin, and were of southern Georgia seed origin. All planting was done by School of Forestry students. A spacing of 6'x6' was maintained as nearly as possible.

Soon after the first of the above trees were planted, it became apparent that open range cattle grazing was seriously damaging the new plantation. An electric fence was installed as a temporary measure. Whether the fence was broken by cattle or cut by local landowners is not definitely known, but after replacing batteries and repairing breaks two or three times it was given up as a remedy. While not a complete success, the fence did obvious good. Seedlings planted after the fence was installed were only slightly damaged, whereas over 50 per cent of the first planting was cattle-injured.

The eating and pulling out of pine seedlings by cattle was not anticipated. It is generally thought by southern foresters that cattle are no serious menace to plantations. In fact they often do considerable good by keeping down grass and rank growth which make for a fire hazard. In the case of this plantation there seems to be too many cows and too little winter grazing. With most of the grass brown and dying back the seedlings attract the cattle.

On August 11, 1949, a 100 per cent survival and growth study was made on this plantation. The following table summarizes the findings:

Species	Survival (%)	Average height (inches)	Cattle Injury (%)	Notes
Loblolly	87.1	8.2	54.0	All planted one month before fencing.
Lob-slash	83.8	7.7	51.8	Planted 2-4 weeks before fencing.
Slash	73.8	9.0	25.6	Half planted before and half planted after fencing.
Slash-Loblolly	86.2	11.2	11.8	Planted after fencing.
Loblolly	93.9	11.0	17.5	Planted after fencing.
Mean	83.1	9.3	31.8	

The average survival of 83 per cent is considered quite good. While it is true that about one-third of all seedlings were nipped by cattle, they are still alive and should recover. A lateral shoot will become the new leader and after several years growth it will probably be difficult to pick out the "cattle-injured" trees. The average height for seedlings of 9.3 inches is not impressive. Had the cattle not eaten off the leaders, the trees would probably have averaged a foot high. It must also be remembered that the first season after transplanting is one requiring adjustment to a new site. Greater growth is anticipated during the second season.

In the course of the survival count additional injury or attack was noted by pine tipmoths and cutworms. The tipmoths lay their eggs in the terminal buds on which the larvae feed. A lateral bud then assumes dominance. If repeated over a period of years this injury will result in a bushy, poorly-formed tree. Normally our southern pines are vigorous enough to simply outgrow the insect attack. The cutworm damage involves the loss of foliage only. The seedling's growth is retarded somewhat but usually not in a serious way. Both of these hazards as well as any other disease or insect pests will be watched in the future.

Progress During 1949-50 Season

During January, 1950, this plantation was enlarged by planting additional plots as follows:

1. Two one-acre plots of longleaf pine.
2. Two one-acre plots of a 5-row longleaf-slash pine mixture.
3. Necessary isolation strips totalling 2 acres between test plots.

The longleaf pine seedlings were obtained from the Louisiana Forestry Commission nursery at Oberlin, while the slash pine seedlings were grown in the L. S. U. School of Forestry Tree Nursery. The seed origin of these trees was southern Georgia.

In view of the cattle injury already experienced it was decided a temporary but substantial barbed-wire fence should be constructed.

It was hoped to have this completed before this winter's planting was started. Bad weather prevented completion until late January, 1950.

One-year old longleaf seedlings have no shoot growth like our other pines. For this reason it was thought the cattle would not harm them. Again the cows did the unexpected. The bushy cluster of green needles looked even more like grass than the other seedlings. They bit off practically all of the needles, and in many cases pulled the tree out of the planting slit, only to drop it nearby. Some replanting of this longleaf will be necessary.

The most obvious conclusion to be drawn from this experiment thus far concerns cattle damage to southern pine seedlings. Under certain conditions they can and do eat the needles and shoots of small trees. The conditions probably include overstocking of animals and an overgrazed range. Generally this type of injury will be serious only during the winter season when native forage is at a minimum. It has been suggested that the scrubby type of open range cows will eat anything where better stock will not. This is at least partially discredited. Mr. H. D. Ellzey, Superintendent of this Station, reports damage to pine seedlings by the farm herd, which includes better grade animals. Furthermore this trouble occurred in August when there was sorghum available as feed. In view of the conflicting evidence no general rule can be laid down. Better the tree planter should carefully watch conditions as they exist in the field and take whatever measures necessary to protect his seedlings during the first critical years. —MARTIN B. APPLEQUIST.

Home Economics

Nutritional Status of Louisiana People of Various Age Groups

The collection of data for three studies under the above project which were begun in the fall of 1947 and spring of 1948 has been completed. In July of 1949 the fourth study was begun. The results of the first, "Nutritional Status of Pre-Adolescent Children in a French Community of Louisiana," have been reported. The second study, "The Determination of Certain Blood Values of the White School Children of Louisiana" is nearing completion.

The hematocrit values, erythrocyte counts, hemoglobin concentrations, plasma levels of vitamin A and carotene were determined on venous blood by accepted macro-methods from 515 white Louisiana school children 8 - 13 years of age.

From the results of the hematological determinations the mean corpuscular volume, mean corpuscular hemoglobin and mean corpuscular hemoglobin concentrations were also calculated for the individual subjects.

These blood values were chosen for study as they have been shown to be useful indices in determining the nutritional status of individuals. The data have been tabulated and analyzed according to: 1, the age of the subject; 2, the agricultural area of Louisiana in which the subject lived, and 3, whether the child resided at home or in an institution.

The age grouping was considered important since there have been indications that there are changes which take place in the blood values of children in the process of growth. The sampling of the state was done on a percentage basis of the number enrolled in the white elementary schools in each of the four large agricultural divisions to that of the total enrollment for the entire state.

These four divisions with the number selected within each and the locations of the schools from which subjects were chosen were:

1. South Louisiana Sugar and Truck area—180 subjects from Baton Rouge, Breaux Bridge, Plaquemine and New Orleans.
2. South Louisiana Rice and General Farming—88 subjects from Bunkie and Marksville.
3. North Louisiana Delta—135 subjects from Alexandria, Monroe, Winnsboro and Wisner.
4. North Louisiana Hills—112 subjects from Ruston and Winnfield.

The institutions from which 37 subjects were selected included

Gumbel Home in New Orleans, Masonic Home in Alexandria, Protestant Orphanage in Baton Rouge and the Baptist Children's Home in Monroe. The other 478 children were living with their families.

A summarization of the data gave the following facts: The mean hemoglobin values for the entire group was 13.1 ± 1.14 gms. Seventy per cent of the values fell between 12.1 to 14.0 gms. and 16 per cent had values above 14.0 gms. Thirteen grams per 100 c. c. of blood has been suggested by Macy as a standard for children. Others have used values above 12 gms. as normal.

The means for the four areas were: South Louisiana Sugar and Truck, 13.1 gms; South Louisiana Rice and General Farming, 13.4 gms; North Louisiana Delta, 13.1 gms; and North Louisiana Hills, 13.0 gms. per 100 c. c.

On the whole the hematocrit values and erythrocyte counts were found to be within the normal range for the ages studied. The mean for the hematocrit values was 41.5 ± 4.52 c. c. per 10 c. c. and for the erythrocyte count 4.91 ± 0.38 millions per c. c. The values considered normal for hematocrits are 39 to 42 c. c. per 100 c. c. and for red cell counts 4.5 to 5 million per c. c. The mean values of the group for their mean corpuscular volume (M.C.V.); mean corpuscular hemoglobin (M.C.H.) and mean corpuscular hemoglobin concentrations (M.C.H.C.) were 85 cubic microns, 27 micrograms and 37 per cent, respectively. These compare well to the standards which are for M. C. V. 85 ± 5 c. microns for M. C. H. 29 ± 2 mcg and M. C. H. C. 34 per cent ± 2 . These values along with good hemoglobin values found seem to indicate that anemia is not a problem among the Louisiana school children studied.

The mean for plasma carotene was 130.8 mcg per 100 gram and for vitamin A 40.1 mcg. These values are within the range of values now considered "fair" for these two nutrients. At present the range most often stated as normal for carotene is 75 to 300 micrograms per 100 c. c. and for vitamin A, 30 to 70 micrograms. Values below 100 mcg for carotene and 30 micrograms for vitamin A are considered low, while those for carotene above 200 mcg and for vitamin A above 50 are termed excellent. Fifty-one per cent of the children had carotene values of 100 mcg per 100 c. c. or below and 3 per cent above 200. Twenty-seven per cent had vitamin A values of 30 mcg or below yet 29 per cent had values above 50.

There was no specific relationship found between carotene and vitamin A plasma values. The order of high to low for carotene values for the four areas was 1, South Louisiana Sugar and Truck area; 2, North Louisiana Hills; 3, South Louisiana Rice and General Farming; and 4, North Louisiana Delta. For Vitamin A the order was 1, South Louisiana Rice and General Farming; 2, North Louisiana Hills; 3, North Louisiana Delta; and 4, South Louisiana Sugar and Truck.

There is to be a comparison made between these data and those obtained in the following study dealing with the food habits of these subjects.

A Dietary Study of Louisiana White Elementary School Children

Seven-day records of the food intake of 671 children from the four areas listed above have been summarized. Table 1 shows the percentage of girls and boys in each agricultural area who received a good intake of the eleven groups of foods as recommended by the Food and Nutrition Board of the National Research Council.

Over 70 per cent of the girls and boys had good intake of milk, meat and whole grain or enriched cereals. Sixty-two per cent of the subjects had adequate intake of yellow and green vegetables, while only 43 per cent had good sources of ascorbic acid as shown by their intake of citrus fruit and raw vegetables. Only one-third of the group had from 4 to 6 eggs a week. Less than 10 per cent recorded eating butter or margarine.

—DOROTHY R. MOSCHETTE, LAUREAME C. MCBRYDE, ECHO L. PRICE.

Percentage of School Children from the Four Agricultural Areas of Louisiana who Consumed Amounts of Protective Foods Recommended by the National Research Council

FOOD GROUPS												
Agricultural Areas	No. Cases	Yellow, green and leafy vegetables	Citrus and raw fruits	Other cooked vegetables	Potatoes	Other fruits and raw vegetables	Milk	Meat	Eggs	Meat Substitute	Whole grain cereal	Butter or margarine
		tables	fruits	tables		tables						
So. La. Sugar & Truck	Girls	63	51	27	11	40	82	80	33	9	79	18
	Boys	59	39	17	14	27	75	66	34	12	79	12
	Total	61	45	22	12	34	79	73	34	11	79	15
So. La. Rice & Gen. Farm	Girls	41	34	6	27	27	73	70	28	7	84	2
	Boys	46	42	14	12	22	83	79	34	10	84	3
	Total	44	38	10	19	25	78	75	31	9	84	2
North La. Delta	Girls	66	47	31	18	47	67	90	27	2	85	0
	Boys	74	45	34	8	43	65	67	30	3	81	3
	Total	70	46	33	13	45	66	79	29	3	83	2
North La. Hills	Girls	73	40	30	22	22	60	75	40	10	70	10
	Boys	85	41	41	24	25	61	56	47	7	65	9
	Total	79	41	36	23	24	61	66	44	9	68	10
Grand Totals	Girls	60	45	24	17	36	74	80	32	7	80	9
	Boys	63	41	23	14	29	72	67	36	9	78	8
	Total	62	43	23	16	32	73	73	34	8	79	9

Horticulture Research

This past year has been one that has marked a great advance in the Department of Horticulture. Horticulture research and teaching are now housed in the new Agronomy-Horticulture Building, with facilities as good as any in the South. These include cold storages and laboratories that have not been available in the past. A balanced research program can now be organized to answer the needs of the growers of the state. This is particularly true since adequate funds were made available for floriculture work this past season. Also the new sweet potato research station at Chase was established where the production and testing of new seedlings and the increase of foundation seed stock will be carried out. Further cooperative research work has been established at the new Plaquemines Parish Experiment Station and at the North Louisiana Hill Farm Station, in addition to the horticulture work at the Fruit and Truck Experiment Station at Hammond and at the North Louisiana Experiment Station at Calhoun. Every effort is being made to coordinate the work at these stations with that at the central laboratory on the main campus where more laboratory facilities are available for fundamental research.

All of this is in keeping with the general theme of the University for 1950, as we take steps to show the progress that has been made by the University at mid-century.

Lima Bean Breeding

Since the lima bean is one of the most nutritious of the summer vegetables for the home garden as well as for commercial use, a breeding program was started a number of years ago to breed improved varieties for the South. Crosses were made between Carolina sieva, a small-seeded, pole bean, ideally suited for the South, and Fordhook, a large-seeded lima of the North which is considered of high table quality.

A number of selections were made and tested which, in the green stage, showed a dry weight of 43 per cent solids; ascorbic acid, 17.0 mgs. per 100 gram sample; crude protein 26 per cent; and total sugar content, 2.75 per cent. These qualities, coupled with production, are very promising.

Two of the better selections are now being increased for distribution. These are L 1-1, a small-seeded bean, and L 39-11F, a medium size bean with a pod which shells very easily. Yield tests show that each of the new selections produced over 6000 pounds of shelled beans per acre. Of the commercial varieties, the Willow Leaf variety produced equally as well as L 1-1 and L 39-11F, but did not have the quality of the two new selections. The pods of L 39-11F are much

larger than those of any of the southern varieties, and the beans are of higher quality. The pods themselves shell very easily, and the variety will probably be named "Easysshell" because of this particular character. This selection begins to produce early in the season and fruits until killed by frost in the fall, producing a new crop of beans about every six weeks during the season. Selection L 1-1 has small seed of a high sugar content, and it sets a large number of pods per flower cluster.—RAYMON E. WEBB AND JULIAN C. MILLER.

Cabbage Breeding and Varietal Trials

The Louisiana Allyear, a recent introduction of the Louisiana Agricultural Experiment Station, was grown as a fall crop in yield trials in comparison with other standard varieties both at the Louisiana State University and at Breaux Bridge. Standard cultural practices were the same for all plantings. The yields are given in Table 1.

TABLE 1. Average of Yield Tests Conducted at Baton Rouge and Breaux Bridge

Variety	Yield in pounds per acre				
	Very early harvest	Early harvest	Medium harvest	Late harvest	Total all harvests
Louisiana Allyear	341.8	748.2	4,056.5	5,414.7	10,561.2
Ferry's Round Dutch	874.5	1,148.4	4,791.6	2,099.3	8,913.8
Glory of Enkhuizen	1,455.7	1,073.9	4,856.6	3,386.5	10,772.7
Golden Acre	3,029.5	1,242.1	3,599.7	1,607.8	9,479.1
Copenhagen Market	2,693.7	1,906.5	3,459.1	1,824.1	9,883.4

The yield data show that Louisiana Allyear outyielded all other varieties except Glory of Enkhuizen; however, the differences in yield were not significant between the two varieties. It was not as early as Golden Acre or Copenhagen Market, but it proved to be more resistant to cold and other weather damage, as well as to mildew and black rot than all of the other varieties in the trials.

— JULIAN C. MILLER AND JAMES F. FONTENOT.

Irish Potato Breeding

Promising first year seedlings are being grown and tested in Louisiana, Tennessee and South Dakota. Promising seedlings were selected for yield trials and to be inoculated with the late blight organism to determine their degree of resistance. Seventy-five second year seedlings were increased for spring and fall trials. Most of these have some degree of resistance to either late blight or scab.

Promising varieties were tested at five locations as indicated in Table 2.

TABLE 2. Average Yield in Bushels per Acre in the Potato Variety Tests at Five Locations in Louisiana

Variety	Baton Rouge	Thibodaux	Plaquemines Parish	Hammond	Calhoun
DeSoto	146.6	147.4	136.1	181.5	67.0
Katahdin	146.6	174.2	113.4	143.7	44.0
LaSoda	133.9	112.5	181.5	135.6	55.0
Triumph	83.0	98.0	163.4	192.0	51.1
LaSalle	112.4	90.8	90.8	135.6	48.5

DeSoto, Katahdin and LaSoda did well in all locations except at Calhoun. DeSoto and Triumph seem to be better adapted to the light sandy soils of the Hammond and Calhoun areas.

—JULIAN C. MILLER AND RAYMON E. WEBB.

Sweet Potato Breeding and Seed Stock Increase

Although the sweet potato work at Chase was started late in the year, 4500 new seedlings were grown and promising selections and varieties were increased. These better varieties and selections will be increased further in 1950 for distribution to certified growers and shippers.

Of the 4500 seedlings grown, only 70 were selected for further study, the more promising of which are listed in Table 3.

TABLE 3. Dry Weight and Carotene Analysis of Varieties and Promising Seedlings

Variety or seedling	Dry weight of potato	Carotene or pro-vitamin A content mg/ 100 g. fresh wt.
Table Stock Varieties		
Unit I Porto Rico	29.16	7.30
9-20	31.21	18.82
9-31	29.41	20.32
9-38	28.75	19.40
9-49	38.04	8.31
9-63	29.57	20.48
Feed and Starch Selections		
9-16	38.55	0.22
9-24	36.05	5.03
9-25	37.16	1.44
9-29	36.50	5.22
Starch Potatoes		
Pelican Processor	41.87	-1.00
Whitestar	44.28	-1.00
L-230	45.38	-1.00

It will be noted that the carotene or pro-Vitamin A values of some of the better selections are practically three times as high as that of the standard, Unit 1 Porto Rico, which has 7.30 mgs./100 grams of fresh weight, and the best seedling runs as high as 20.48 mgs. per 100 grams

TABLE 4. Combined Data of Some Promising Seedlings and Standard Varieties of Sweet Potatoes
(Two-year average — 1948 and 1949)

Variety or seedling	Marketable Potatoes Bushels per Acre*				Disease Reading		Per cent dry matter	Carotene content mg/100 gm fresh wt.	Cooking test
	Baton Rouge	Lafayette	Sunset	Av. for locations	Wilt				
					Soil rot				
Unit I									
Port Rico	290.4	494.6	257.6	347.5	V.S.	V.S.	32.43	6.1	1
Heartogold	309.6	590.7	318.2	406.2	V.S.	M.S.	28.75	7.1	1
Queen Mary	173.2	373.6	209.7	252.2	V.S.	V.S.	28.54	8.6	1
L-224	204.1	523.3	334.2	275.2	S.	M.S.	34.41	10.9	1
L-240	287.9	571.7	253.9	371.2	V.S.	V.S.	30.65	7.0	1
L-241	246.7	451.7	244.6	314.3	R.	M.S.	29.11	12.1	1

*55 pounds per bushel

V.S. — very susceptible
S. — susceptible
M.S. — moderately susceptible
R. — resistant

1 — excellent
2 — good
3 — fair
4 — poor

of fresh weight. It will be further noted that seedling 9-49 has practically 10 per cent more solids and 1 per cent more carotene than Unit 1 Porto Rico, the standard; and also of the starch varieties that seedling L-230 runs 4 per cent higher in solids than the Pelican Processor and Whitestar, which are the standard feed and starch varieties.

Yields of promising varieties and seedlings were obtained at eight different locations; however, data are only presented from three locations where these varieties were grown last year and where an average could be presented. These data represent a 2-year average. It will be noted that Heartogold produced the highest yield, followed next by seedling L-240. However, when considering all factors, seedling L-241 would be considered the best all-around potato, since it produces a higher percentage of No. 1's, is resistant to wilt and moderately resistant to soil rot, and is about twice as high in carotene as the standard, Unit 1 Porto Rico. This seedling looks unusually promising and will probably be named at the next annual sweet potato meeting. This seedling has more promising characters in one potato than any seedling we have ever grown.

—JULIAN C. MILLER, TOME P. HERNANDEZ, JAMES F. FONTENOT,
AND RITA BELLE ATTAYA.

A Study of the Chilling Requirements for Peaches in North Louisiana

The mild winter of 1948-49 gave an excellent opportunity to evaluate a limited number of peach varieties as to their chilling requirements necessary for fruiting. There were 861 hours during the winter when the temperature ranged from 45°F. or below. Fruit bud counts were made on uniformly vigorous trees of 14 varieties of peaches. Fruit counts were made after the June drop was completed.

This season's work would indicate that Sunhigh and Southland are varieties of low chilling requirements for fruit bud development. Varieties with medium chilling requirements are July Elberta, Dixigem, Golden Jubilee, Triogem, Sullivan Elberta, Early Jubilee, False Fireglow, Elberta and Belle of Georgia. Weather conditions in North Louisiana are such that consistent fruiting cannot be expected from varieties that do not come within either of the above groups.

—P. L. HAWTHORNE AND JOHN C. TAYLOR.

Ornamental Horticulture

The work on the physical setup for experiments to be conducted with ornamental plants is progressing nicely. A three-acre tract of ground was assigned for field plots. A fence has been built around the area and the road around it has been black-topped. The road was necessary to keep down dust and as a convenience to the many visitors to the plots. A quonset type implement shed was constructed across the road from the field area. Greenhouses have been constructed

back of the old greenhouses. A lath house was built diagonally across the road from the old greenhouses.

A planting of roses was made. This consists mainly of a fertilizer experiment in which treatments are replicated three times, and a variety test of six plants each of 33 kinds. The roses made exceptionally good growth last year and bloomed profusely. There was no noticeable difference in growth or blossom production for the first year due to the fertilizer treatment. Based on one season only, several varieties beside the four generally recommended—Red and Pink Radiance, Etoile de Hollande and Editor McFarland—seemed very promising. They are Peace, Nocturne, Countess Vandal, Eclipse, Charlotte Armstrong, Mirandy, Crimson Glory, Tallyho, and Lowell Thomas.

A mulch experiment with camellias has been started. Nine types of mulch are being tested on six varieties of camellias. A fertilizer test has been started with eight treatments being used on four varieties. Two plants each of about 80 varieties have been set out as a variety test. Propagation work that was started about three years ago is being continued and expanded. There were no noticeable differences in growth last season due to mulch treatment or fertilizer. The season last year was very wet and that may partially explain why no differences were apparent. Some interesting results are being obtained with propagation by cuttings.

Work that has been conducted with gladiolus is being continued. At the present time this is mainly testing varieties for adaptability and breeding work to develop superior varieties for this area. On the basis of one year's results, the following additional varieties seem promising: Leading Lady, Snow Princess, Burma, King Lear and Wanda.

Except for the breeding work, Easter Lily projects are being conducted at the Plaquemines Parish substation. Bulbs that were apparently free of disease were obtained from Alabama to plant in a fertilizer and spacing test.

Plantings have been made with several bulb crops, including iris, chrysanthemums and day lilies.

Those interested are welcome to visit the experimental plots, and for that reason gates are kept unlocked most of the time. Of course, it is understood that plants are not to be molested in any way. Interest in the project is shown by the number of visitors who have seen the test plots and expressions of approval of what is being done.

—W. D. KIMBROUGH AND R. H. HANCHEY.

Vegetable Seed Increase Work

New varieties of vegetable crops bred by the Louisiana Agricultural Experiment Station are important in the state's agriculture as a result of the program of assisting farmers in increasing seed of these varieties. During the year, assistance was given seed and plant growers in the production and selling of 431,200 pounds of improved seed, 25,695,000

plants and 20,800 bushels of seed potatoes and Easter lilies, all with a total value of \$205,020. The \$205,020 value compares with \$37,649 for 1944 when this project was started. The increased monetary value has been due to increased production and wider use, since the price of these improved varieties has remained fairly constant.

The accompanying table presents a summary and value of seed and plants produced under inspection in 1949.

Item	Quantity	Unit Price	Value
Collards (Louisiana Sweet)	1,200 lbs.	\$.35 per lb.	\$ 420.00
Corn (Louisiana Bayou)	2,500 lbs.	.25 per lb.	625.00
Lillies (Creole Certified)	300 bus.	15.00 per bu.	4,500.00
Okra (Green Velvet)	10,000 lbs.	.20 per lb.	2,000.00
Okra (Louisiana Market)	1,200 lbs.	.25 per lb.	300.00
Onions (C-5)	950 lbs.	4.00 per lb.	3,800.00
Shallots (Louisiana Pearl)	400,000 lbs.	.12 per lb.	48,000.00
Strawberry plants (Konvoy, Klonmore, Marion Bell, and new seedlings)	2,695,000 plants	5.00 per M	13,475.00
Sweet Potatoes (Unit 1)	18,000 bus.	4.00 per bu.	48,000.00
Sweet Potatoes (Heartogold)	2,000 bus.	4.00 per bu.	8,000.00
Sweet Potatoes (L-240,L-241 and other new seedlings)	500 bus.	5.00 per bu.	2,500.00
Sweet Potato Plants	23,000,000 plants	3.00 per M	69,000.00
Peppers (Dixie Wonder)	350 lbs.	4.00 per lb.	1,400.00
Peas (Calhoun Crowder)	15,000 lbs.	.20 per lb.	3,000.00

—JOSEPH MONTELARO.

Plant Pathology

Seed Treatment for Water-Planted Rice

Several chemicals were used in 1949 at the Rice Experiment Station as seed treating materials for rice seed for planting by broadcasting in flooded fields. In previous tests the copper fungicides, such as Yellow Cuprocide, had been found to be more effective than Arasan and other organic materials when the fields were flooded continuously. The effectiveness of the copper compound was again demonstrated in the 1949 tests. In addition to Yellow Cuprocide, Tri-Basic Copper Sulphate and Carbide and Carbon Experimental Fungicide 640 were also effective.

Results obtained indicate that with continuous flooding, Yellow Cuprocide at a dosage of two ounces per bushel should give satisfactory and uniform stands of water-planted rice. The tests also indicate that the rate of seeding may be reduced when treated seed is used. The cost of the chemical for treatment should not be more than five or six cents per bushel.—J. G. ATKINS, JR., AND PAUL BOUCHEREAU.

Seed Treatment for Drilled Rice

In addition to the fungicide Arasan, which is the one most widely used in Louisiana for treating rice seed, eight other chemicals were tested in 1949 at the Rice Experiment Station at three seeding dates. Spergon, Phygon-XL, Ceresan M, and Experimental Fungicide KF-467 gave stand increases comparable to the standard Arasan treatment. Two copper fungicides included in the tests were less effective than the other materials.

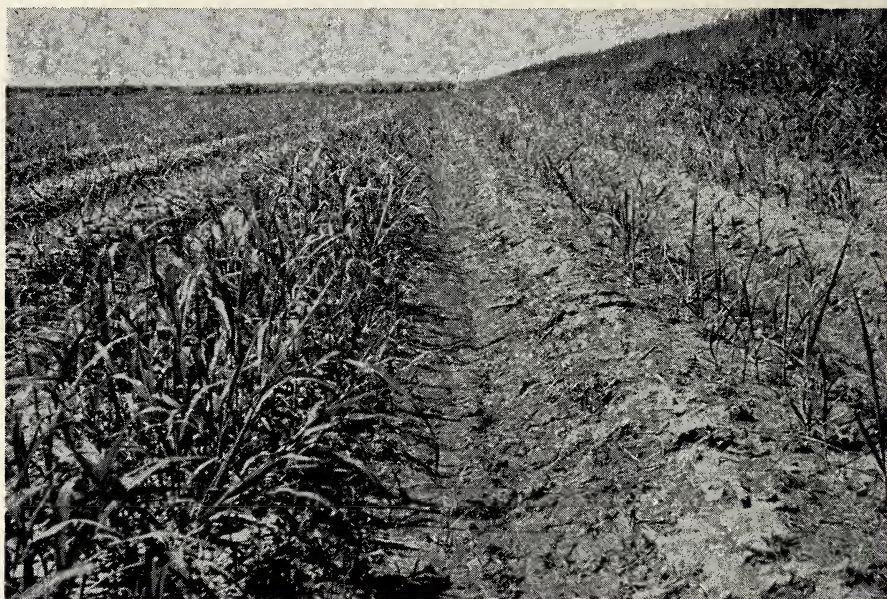
Certain of the chemicals doubled the stands for rice seed planted in March when conditions for emergence were adverse. Stand increases were smaller for rice planted later. Rice seed treatment, a standard practice of many Louisiana rice growers, is recommended as insurance for adequate stands.—J. G. ATKINS, JR.

Johnson Grass Control in Sugar Cane Fields

A large number of experiments were made in 1949 in an attempt to find efficient methods of controlling Johnson grass in sugar cane fields. Fallow plowing to destroy the rhizomes in the year no cane is grown seems to be a necessary part of the control program. Pre-emergence sprays with 2,4-D followed by flame cultivation in the fall and spring to kill seedlings, and in certain cases hand roguing, have given good control of Johnson grass in plant cane. When such practices have been followed, it has not been necessary to hoe. The cost of this program has been \$12 to \$16 an acre for the fallow plowing, and \$9 to \$11 an acre for the plant cane crop. Spraying with chemicals

such as sodium chlorate, sodium trichloroacetate and ammonium trichloroacetate, has given good results on ditchbanks and headlands when applied in sufficient amounts and at the correct time.

—E. R. STAMPER, E. S. HAGOOD, AND S. J. P. CHILTON.



Johnson grass seedling control in summer plant cane. Untreated row on left, 2,4-D plus flaming on right.

Weed Control in Cotton

Further tests were carried out in 1949 to determine the possibility of controlling weeds in cotton with chemicals. The 13 per cent ammonium salt formulation of the dinitro herbicides and equivalent dinitro oil formulations were applied as pre-emergence sprays after the cotton was planted, and the seedbeds compacted to uniform smoothness with the cultipacker. Post-emergence, directed sprays of aromatic oils were studied as a means of controlling weeds after germination.

The results with pre-emergence dinitro sprays indicated satisfactory weed control for 4 to 6 weeks, when 6 pounds per acre were applied. Post-emergence applications of certain of the aromatic oils, at the rate of 60 gallons per acre, resulted in good weed control without injury to the cotton.

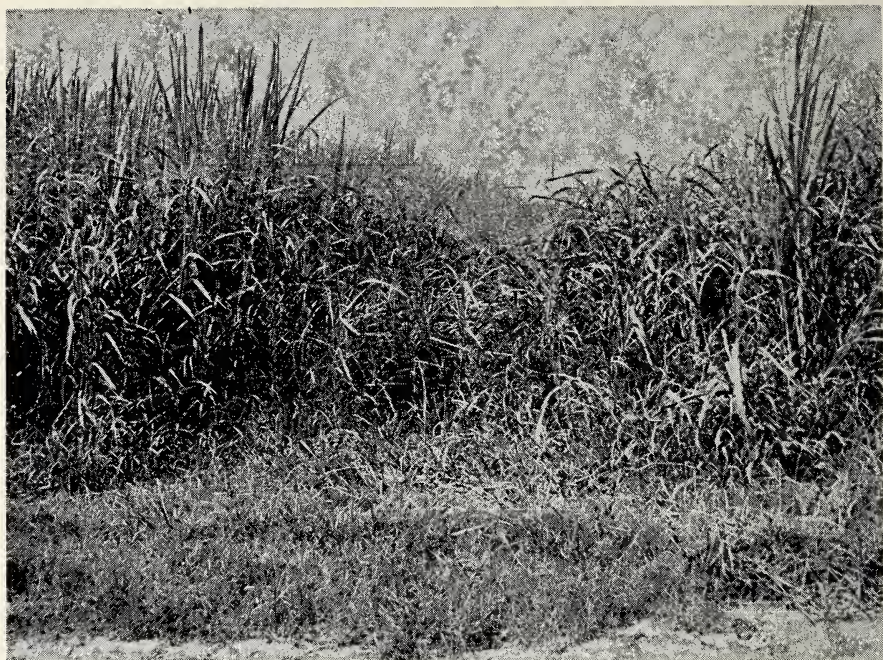
The results obtained indicated that post-emergence applications of aromatic oils can be successfully employed to control weeds 6 to 8 weeks after the application of pre-emergence sprays. These two methods combined with good cultural practices have in tests reduced hand hoeing to a minimum.

In 1949 cotton was grown without any hand hoeing and the yields were equal to those in fields which were hand hoed.

—L. E. COWART AND E. R. STAMPER.



Johnson grass seedling control in plant cane. Above: Plant cane in August after a control program of 2,4-D plus flaming. Below: Hoed check.



Johnson grass control on ditchbanks. Above: Infested ditchbank before treatment. Below: Six months after treatment with sodium chlorate at 600 pounds per acre.

Weed Control in Rice

As a result of numerous tests carried on during the past three years, the use of 2,4-D as a herbicide to control weeds in rice fields has become an established practice. It is estimated that 150,000 acres, or 25 per cent of the rice crop in Louisiana, were treated with 2,4-D in 1949. This chemical has been of great value in controlling the broad-leaved weeds but has not been useful in controlling the grasses. At the present time other chemicals are being tested with the hope that one may be found which may be of value in controlling the troublesome grasses. Some of the tests have been promising and the investigations will be continued. —T. C. RYKER AND E. R. STAMPER.

Black Rot of Sweet Potatoes

Dipping sweet potatoes in a one per cent solution of borax has given practical control of black rot in washed, uncured sweet potatoes. Other methods are being investigated for reducing the prevalence of black rot in the field and in storage. Naturally, if field infestations of black rot could be eliminated, the problems of control in transit and storage would be minor.

Recent experiments indicate that the black rot fungus is killed by exposure for 24 hours at 43.5 degrees C. (110 degrees F.). The fungus could not be recovered from exposed sweet potatoes affected with black rot, whereas it was readily recovered from comparable unexposed potatoes. After three months in storage, exposed sweet potatoes had developed normal healthy sprouts, while the unexposed, check potatoes had rotted. Experiments with black rot-free sweet potatoes exposed for 24 hours at 43.5 degrees C. and stored for three months showed no deleterious effects to the sweet potatoes from the exposure. Further investigations appear to be warranted on the value of this method for insuring black rot-free seed potatoes. —W. J. MARTIN.

Breeding of Disease Resistant Shallots

In 1949 a number of F_1 amphidiploid hybrids were tested in the field for resistance to pink root and yellow dwarf. These hybrids were produced by crossing the Nebuka onion with Southport white globe and white Portugal onions. The seedlings were grown in pink root-infested soil and were exposed to natural infection by the yellow dwarf virus by interplanting them with virus infected shallots. All these hybrids were entirely too large and coarse for use as bunching onions. Some of them divided like shallots but the number of divisions was too small. These amphidiploids were apparently resistant to both pink root and yellow dwarf. Several of the best looking hybrids were kept for possible use later in the breeding program. —E. C. TIMS.

Corky Excrescence of Camellias

Corky excrescence is a striking disease of camellias, characterized by numerous brown raised corky lesions. Because *Sphaceloma* sp. can

often be isolated from such lesions, it was believed earlier that this fungus was the cause of the disease. The information obtained during the past year, however, indicates rather strongly that corky excrescence is not caused by *Sphaceloma* but that it is a non-parasitic disease probably tied up with fluctuations of soil moisture.

The following evidence supports the view that corky excrescence is a physiogenic disease: (1) Inoculations with *Sphaceloma* did not reproduce the disease. (2) Spraying with Bordeaux mixture just before new growth starts in the spring (a practice that has been found efficacious against scab diseases in general) gave no control. (3) Direct examination of sectioned material (both fresh and fixed and stained) showed that in the great majority of cases no fungus was present in the tissue. (4) Although the same disease is present on camellias in California, all attempts to isolate *Sphaceloma* from California material failed. This is considered a very significant bit of evidence because camellia scab (which is caused by *Sphaceloma*) does not occur in California. (5) Spraying with a wax emulsion (Dow wax) at monthly intervals (June, July and August) completely prevented the disease. It is believed that this was due to the reduction of the transpiration rate by partially sealing the stomata by the wax. These results are in agreement with those obtained by other investigators in preventing blossom-end rot of tomatoes (another disease due to fluctuation in soil moisture) by wax sprays. —A. G. PLAKIDAS.

Late Blight of Irish Potatoes

In 1949 late blight was found in the Bayou Blue area of Lafourche parish on March 31. With the conditions extremely favorable for blight development in early April, the disease had reached epidemic proportions by mid-April. Much of the late-planted crop in this area and in Terrebonne parish was a complete loss as a result of late blight. Individual growers dusted many fields with a Dithane dust after the appearance of the disease. However, the near-ideal conditions for disease development resulted in relatively poor control by dusting after the disease became established. On the other hand, relatively good control of late blight was obtained, even under the severe epidemic conditions, by use of Dithane D-14 spray applied with a power sprayer. Under less favorable conditions for blight development, dusting may be expected to compare more favorably with spraying as a means of controlling late blight. —W. J. MARTIN.

Mottle Necrosis of Sweet Potatoes

This disease was recorded for the first time in Louisiana during the growing season of 1949. It is caused by an undetermined fungus of the *Phythium-Phytophthora* complex. The disease was very destructive in several fields in the heavier soils in the Leonville area of St. Landry parish. The potatoes in infested fields were affected with a cheesy type of rot which had a very pungent odor, especially when the pota-

toes were plowed up at digging time. Losses ranged from a trace in some fields to almost complete losses in a few fields. The fungus causing the disease is soil-borne. Apparently it is relatively non-pa-



Mottle necrosis of sweet potatoes showing interior symptoms.

sitic to sweet potatoes except under conditions of very high soil moisture, similar to those which existed in the Leonville area during July and August, 1949. Under laboratory conditions mottle necrosis was reproduced typically only when inoculated potatoes were kept under very wet conditions.—W. J. MARTIN.

Camellia Scab (*Sphaceloma* Sp.)

This is not a serious disease. It neither kills nor injures the plant appreciably, but because it causes ugly spots on the leaves, it arouses some concern among camellia growers. Work on this disease the past year was limited to inoculations during different stages of growth in an effort to determine the period of the year during which infection takes place, with the object in view of devising preventive measures. A small amount of infection was secured when pure culture inoculum of *Sphaceloma* was applied to the young growth in the spring. Apparently, the conditions favoring infection have not been discovered, because only a relatively small amount of infection was obtained.

—A. G. FLAKIDAS.

Oat Diseases in Louisiana

The three most destructive diseases of oats in Louisiana are crown rust, stem rust and *Helminthosporium* or Victoria blight. These three diseases vary in severity from year to year, from variety to variety,

and from the southern to the northern section of the state. In 1949 a large number of oat varieties and selections were examined for disease resistance in nursery plots at the Red River Valley, Northeast Louisiana, Rice, North Louisiana Hill Farm, and Baton Rouge Experiment Stations.

In 1949 stem rust was, in general, less severe and caused less damage than in certain previous years. Crown rust appeared very early in South Louisiana and caused severe damage in the whole state. The more susceptible varieties were killed prior to heading. Some of the Bond varieties, such as Clinton, were severely attacked by certain strains of the crown rust fungus. *Heminthosporium* blight caused severe losses on susceptible varieties in South Louisiana but was of less importance in North Louisiana.

Although *Helminthosporium victoriae* causes a seedling blight by attacking young plants in Louisiana, the greatest damage results when the oats are in the heading stage or approaching maturity. The fungus not only causes lodging by attacking the basal nodes or joints, which become black, but also causes a leaf spot. The leaf spots are large, oval to circular, and gray to brown. When the leaf spots are numerous, alone or in combination with rust, nearly all of the leaves may be killed before the grain is mature. The invasion of the leaves, as well as the attack upon the basal nodes, results in premature ripening and low yields of light-weight grain.

The varieties susceptible to *Helminthosporium* blight, including such varieties as Victorgrain, Fultex, Letoria, Fulgrain and DeSoto, are hazardous for growing in Louisiana, particularly in the southern part of the state. Some damage from rust can be expected on the varieties which are resistant to *Helminthosporium* blight, i. e., Camellia, Hastings Hundred Bushel, Ferguson 922, and Nortex strains.

—J. G. ATKINS, JR., AND J. P. GRAY.

Pea and Vetch Diseases

In late winter and spring both peas and vetches show severe disease symptoms consisting of leaf spots, stem lesions, stem rots and dying of plants. A study of the fungi attacking the stems and leaves has been made and a similar study of those attacking the roots has been initiated.

A leaf spot caused by *Ascochyta pisi* is very common on Creole peas and the garden types of *Pisum sativum* but is of no importance on the field types. Both Austrian Winter and Dixie Wonder peas were found to be resistant in inoculation tests. However, two related fungi, *Ascochyta pinodella* and *Mycosphaerella pinodes*, cause severe damage on Austrian Winter and Dixie Wonder peas as well as on the garden types. These fungi produce leaf spots, stem spots, foot and root rots and general discoloration of the stems near the soil line. *Colletotrichum pisi*, an anthracnose fungus, is frequently found associated with diseased

pea stems but is much less pathogenic in inoculation tests than the two *Ascochyta* fungi.

In a study of some of the vetch diseases the anthracnose fungi were found to be important as pathogens causing stem discoloration and leaf spots. In addition to *Colletotrichum villosum*, which was found in Georgia several years ago and was later found in Louisiana, another *Colletotrichum* has been found in Louisiana which is apparently different. The symptoms produced by the two are quite similar. The



Effect of *Colletotrichum* sp. on two species of vetch. Common vetch on left and hairy vetch on right. Pots 2 and 4 inoculated with *Colletotrichum* sp. Pots 1 and 3 uninoculated checks.

anthracnose studied in Louisiana is very pathogenic on common, Wilamette, and a number of other vetch varieties. Hairy vetch is resistant, and purple vetch is highly resistant. Hungarian vetch is somewhat resistant.

General observations indicate that both pea and vetch diseases may be partially controlled and better growth obtained when planting is done on ridges or beds and where drainage is satisfactory. A large number of pea and vetch varieties or strains are being tested for disease resistance. —J. G. ATKINS, JR., AND N. L. HORN.

Producing New Sugar Cane Seedlings

Based on a special appropriation of the Louisiana State Legislature, the Department of Plant Pathology has started the production on a large scale of sugar cane seedlings. The work was started in 1949. The true seed are produced at Canal Point, Florida, and these are planted in the greenhouse at Baton Rouge. The seedlings are planted in the field and the best are selected for further tests. In 1949, 104,000 seedlings were grown. Of these, 40,000 were transplanted to the field. Selections of the best plants were made in the fall and were replanted at Baton Rouge and Franklin. These will be studied and tested with the hope that some will be found valuable for commercial

planting. In the winter of 1949-1950, similar greenhouse plantings of seed were made at Baton Rouge.

—P. H. DUNCKELMAN, P. J. MILLS, AND S. J. P. CHILTON.

Internal Cork of Sweet Potatoes

Experiments with hot water and dry heat treatments of mother potatoes and vine cuttings for controlling internal cork of sweet pota-



Ring spot and internal cork of sweet potatoes. Top: A leaf with ring spot. Below: Internal cork symptoms. These two symptoms are apparently of different diseases.

toes have not been successful. The maximum temperatures tolerated by mother potatoes and vine cuttings appear to be insufficient for destroying the cork virus.

Data from lots of sweet potatoes grown from plants exhibiting ring-spotting of leaves and from corky potatoes for three consecutive years strongly indicate that the causative agent of ring spots on leaves is different from that which causes cork in the potato roots. If such indications are correct, there are no known external symptoms manifested by the internal cork virus.

Transmission studies by core-grafting have shown rather conclusively that the causative agent of cork is a virus or virus complex.

—W. J. MARTIN.

Root Rot and Dieback of Camellias

Dieback of camellias, characterized by poor sickly growth, dying back of twigs and larger branches, and bark cankers, appears to be definitely associated with injuries of the root system. It is true that a fungus (*Colletotrichum* or *Gloeosporium*) is found associated with, and can be easily isolated from, bark cankers and dieback twigs and branches, but all attempts to reproduce the disease by inoculating healthy plants with this fungus have failed. This indicates that the fungus is a weak parasite incapable of attacking healthy plants growing normally, but may attack plants that have been weakened by some other factor.

One of the predisposing factors to dieback is a root-rot apparently caused primarily by *Phytophthora cinnamomi*, although other soil organisms may play a part. Two fungi, *P. cinnamomi* and *Ramularia* sp., are constantly found associated with decaying roots of sickly camellias. The former proved highly pathogenic to camellias (both to rooted cuttings and to larger plants) when inoculated into sterilized soil. The *Ramularia* alone proved weakly parasitic but seems to act synergistically with the *Phytophthora*, because the root-rot was much more severe when both fungi were used together in the soil than when either was used alone.

It is of interest to note that *P. cinnamomi* has not been isolated from *Camellia sasanqua* roots, while the mildly-pathogenic *Ramularia* has been isolated. This fact is important because the most popular rootstock at present is the *sasanqua*, and it shows marked resistance to root rot.

—A. G. PLAKIDAS.

Controlling Spurweed in Lawns

Spur weed (*Soliva sessilis*), also known as sticker weed or burr grass, is often a troublesome pest in lawns. It is also one of the troublesome weeds in strawberry fields. It has been found that an application of ½ lb. per acre of the amine salt of 2,4-D applied during the period from December to March will control this weed. A proper application made at this time has not been found to seriously injure the lawn grasses or nearby shrubbery.—E. R. STAMPER AND T. C. RYKER.

Soybean Diseases in Louisiana

A survey was made in 1949 to obtain information on the prevalence of soybean diseases in Louisiana. The most serious diseases were bac-



Symptoms of *Helminthosporium vignicola* on leaves, stems, pods and petioles of soybean.

terial pustule (*Xanthomonas phaseoli* var. *sojense*), bacterial blight (*Pseudomonas glycinea*), and Helminthosporium leaf spot (*Helminthosporium vignicola*). The two bacterial diseases were prevalent throughout the state. *Helminthosporium* was most prevalent in the area adjacent to the Mississippi River. Late maturing varieties and selections were observed which were free of all three diseases. In general, most of the early maturing varieties were susceptible to the bacterial diseases.

Minor diseases observed included: mosaic (a virus), bacterial wildfire (*Pseudomonas tabaci*), purple speck (*Cercospora kikuchii*), frog-eye leaf spot (*Cercospora diazu*), pod and stem blight (*Diaporthe phaseolorum* var. *sojae*), anthracnose (*Colletotrichum* sp.), downy mildew (*Peronospora manshurica*), root knot (*Heterodera marioni*), and a chlorotic leaf spot associated with the larval stage of a white fly (*Trialeurodes abutilonea*). Purple speck, which causes a discoloration of the seed coat, occurred in a high percentage of the seed grown at Baton Rouge.

Processors usually object to the discoloration when the seeds are pressed for oil; otherwise, the discoloration is considered of little importance.

—QUINTIN L. HOLDEMAN.



Purple speck of soybean seed caused by *Cercospora kikuchii*.

New Fungicides Effective for Cabbage and Pepper Seed Treatment

The recommendations for treating cabbage and pepper seed involve the use of mercuric chloride for controlling the black rot of cabbage and the bacterial leaf spot of bell pepper, plus the use of zinc oxide on cabbage and copper oxide on pepper seed for controlling damping-off. Tests have been made to determine the effectiveness of Arasan, Phygon-XL, and Spergon for controlling damping-off following the mercuric chloride treatment of cabbage and bell pepper seed. The tests with cabbage involved 900 seeds per treatment and the following per cent stands were obtained: check, 10; zinc oxide, 35; Arasan, 41; Phygon-XL, 31; and Spergon, 27. The tests with pepper involved 1300 seeds per treatment, and the following per cent stands were obtained: check, 24; copper oxide, 30; Arasan, 38; Phygon-XL, 31 and Spergon, 26.

Arasan was the most effective fungicide for controlling damping-off following the mercuric chloride treatment of cabbage and bell pepper seed. —W. J. MARTIN AND J. G. ATKINS, JR.

Poultry Research

Mash Vs. Pellets Vs. Granular Feed for Broilers

The relative efficiency of feed given to broilers in pellet, granular and mash form is of much current interest. Three tests have been completed in which dual purpose bred White P. Rock chicks were floor-brooded for twelve weeks. Diets of identical formula but differing in form were fed for the entire period. The rate of growth and efficiency of feed utilization were checked at weekly intervals. In the first two trials no significant differences were noted in the rate of growth for the three forms of feed. In the third trial the broilers fed granules were significantly heavier than the mash and the pellet-fed birds. Although there were no great differences in pounds of feed required to produce a pound of gain, granule-fed lots were most efficient in two of the three trials and the pellet-fed lot led in the other trial. The mortality was somewhat lower in the lots fed granules but whether this may be attributed to the feed is questionable. Cannibalism was not a problem in the pellet-fed groups as previously reported when pellets are fed.—W. I. STEWART AND C. W. UPP.

So-Called High Energy Broiler Rations

There is a great deal of interest of late in feeding so-called high energy-low fiber rations to broilers. "High energy" rations have a reduced fiber content, thereby providing a greater percentage of digestible nutrients. They are also fortified with vitamins, minerals and the essential amino acids. In recent experiments here the original "Connecticut" ration of this type was compared to a ration in which Louisiana feedstuffs had been substituted. Sweet potato meal and rice polishings replaced one-half of the corn, and shrimp meal replaced the meat scraps in the Louisiana substituted ration. The third group was fed an older type of "simple" broiler ration. Three trials each with triplicated lots of the experimental diets were conducted for twelve-week periods. The R. I. Red stock used had been bred for egg production rather than for the production of broilers.

The average weights and feed efficiency for the different diets are given in Table 1.

TABLE I

Diet	Average Weights		Pounds of feed consumed	
	Males	Females	per lb. of gain	
			Males	Females
Connecticut	3.2	2.8	3.7	3.8
La. Substituted	3.3	2.9	3.8	3.8
Simple	2.8	2.5	4.4	4.3

Little difference was obtained in gains produced and in feed

efficiency with the Louisiana substituted as compared to the Connecticut ration, but both of these diets produced greater gains and more efficient gains than did the simple diet.

—C. C. WILLIAMS AND C. W. UPP.

Seasonal Growth of Broilers

Years of experience with chicks hatched at different seasons of the year have shown definitely that in this climate the date of hatch, or season when they are grown, affects markedly the rate at which chicks grow. The growth rate of even full brothers and sisters is affected so much by season that it is difficult to compare, for example, those hatched in January to those hatched in June. Broiler producers have difficulty in obtaining satisfactory growth with summer hatched chicks. Experiments are underway in which chicks hatched at all seasons will be grown under controlled temperature conditions and compared to others grown under natural climatic conditions. These tests have already aroused considerable interest although they are just being initiated.—C. W. UPP AND W. D. BLACKWELL.

Breed and Strain Differences in Growth Rate

Development of commercial broiler areas and the increasing demand for meat chickens have led to the improvement, by breeding, of growth rate and rapidity of feathering in strains kept especially for the production of broilers. Experiments have been completed in which several of the more popular broiler strains were compared with other general purpose strains that have not been bred for meat production. One broiler strain of New Hampshires averaged 3.8 lbs. at 12 weeks of age, another averaged the same, whereas New Hampshires bred primarily for eggs averaged 3.2 lbs. A crossbred strain averaged 3.5 lbs. White P. Rocks of R.O.P. stock averaged 2.9 lbs. and Dark Cornish 2.8 lbs. The Dark Cornish variety is often used as the male parent in the production of crossbred broilers because of its desirable body conformation. This variety is being bred at this station to improve egg size, egg production, growth rate and reproductive qualities.

These experiments illustrate well the saying of experienced poultrymen that breeding is of more importance than is the breed chosen.

—C. K. ALLEN AND C. W. UPP.

The Inheritance of Morphological Abnormalities

To the research worker and the poultryman, knowledge of the inheritance of abnormalities, whether they be defects or disqualifications rendering the bird unfit for breeding purposes, is always welcomed. Characters under study are long lower beak, spike comb, absence of serrations and telescoped comb. The presence of any of these characters detracts from the appearance of the bird and lowers its sale value and its breeding worth. The long lower beak condition also presents a feed management problem. Birds with extreme long lower

beaks cannotprehend feed unless feed in the hopper is deep enough to allow the beak to be buried. Males so affected have difficulty in mating. Data obtained thus far indicate that the abnormal long lower beak is inherited as an incomplete recessive on a multiple factor basis. It has been eliminated practically from the stock in which it previously was common.

A summary of the progeny of spike comb males mated to spike comb females shows that of 558 progeny classified, 539, or 96.3 per cent, had spike combs. Of the 286 females, 97.6 per cent had spike combs and of the 271 males, 95.6 per cent were affected.

In 1948 another character, absence of serrations on the comb, was added to these breeding experiments. Sufficient data have not been collected to date to determine its mode of inheritance.

—E. WILLIAMS, W. D. BLACKWELL AND W. A. JOHNSON.

Frozen Storage of Poultry

Discoloration of the flesh around the long bones and of the long bones themselves has been a limiting factor in the public acceptance of frozen poultry for some time. Preliminary studies indicate that there is a slight degree of discoloration in fresh-killed, chilled fryers and it increases with freezing. Method of freezing, i. e., sharp (-10° F) or quick (-60° F.), storage in a CO₂ atmosphere or length of storage, have shown no appreciable effect on discoloration. Further work is underway to test other possible causes or methods of prevention of this discoloration. Work is also underway concerning wrapping materials, length of storage and methods of preparation as they affect the keeping quality of frozen poultry.—H. E. HATHAWAY AND C. W. UPP.

Improvement of Dark Cornish Stock

During the past year it appears that significant progress was made in the improvement of Dark Cornish stock. From eight pedigree matings a total of 1506 chicks was hatched from 1770 eggs. The fertility of these eggs was 94.6 per cent and hatchability was 85.1 per cent of all eggs set. This indicates the presence of a highly desirable genetic potential for reproductive ability in the Cornish stock used. Livability of the young chicks, the growing stock and of the parent stock was very good throughout the year. Its continued popularity in southern Louisiana tends to indicate the hardiness of this breed.

The growth rate of the young stock to 12 weeks cannot be called outstanding, but it probably is not below average for the breed and variety. Average weight of males was 2.8 lbs. and of the females 2.25 lbs. Good variability in rate of growth among families was observed so that proper selection pressure can very well bring about substantial improvement. The rate of feathering was generally fast. Future selection work should stress families that tend to have the fewest dark pinfeathers at 12 weeks of age. Of the 80 females used 12 laid 150

eggs or more in their pullet year. One hen laid 215 eggs for the year and her dam laid 203 eggs in 1948. Egg size is substandard, although it is being increased since sufficient variation exists to permit selection for this characteristic. —J. C. GILBREATH, JR. AND C. W. UPP.

Dressing Percentages of Hens and Broilers

The data given below are part of a preliminary test in experiments planned to reveal differences, if any, in the yield of edible flesh of hens and of broilers of different breeds and different ages. R. I. Red hens and Dark Cornish hens were compared. Weights were taken as live birds (held twelve hours without feed), as N. Y. dressed, eviscerated and eviscerated deboned, i. e., edible flesh (excluding giblets, neck and wing tips).

Breed	Expressed as Percentage of Live Weight		
	N. Y. Dressed	Eviscerated	Deboned
Dark Cornish	93.1%	68.8%	39.0%
R. I. Red	92.5%	60.9%	37.4%

These preliminary figures give an indication that differences may exist, although more tests are to be made before conclusions are drawn.

—H. E. HATHAWAY, G. CHAMPAGNE AND C. W. UPP.

Improvement of White Plymouth Rocks through Linebreeding (Progeny Testing), Crossbreeding and Hybridization (Crossed Inbred Lines)

Owing to the complex nature of a study of this kind, it falls naturally into the category of a long-time project. It can be divided into three phases: namely, (1) securing the desired coefficients of inbreeding; (2) testing the most promising lines with different inbred lines of White P. Rocks and other breeds at this station and at the U. S. D. A. Regional Testing Laboratory; (3) when the most promising inbred lines are located and their combinability index determined, this valuable "seed stock" can then be utilized by the poultry industry of Louisiana.

From the 37 brother-sister matings of 1949, 491 pedigreed chicks were produced. Hatchability was about 15 per cent lower in the inbred matings than in the R. O. P. strain of White P. Rocks (65.4 per cent as compared to 80.3 per cent). However, in the matter of fertility, body weight to eight weeks and at maturity, rate of feathering, mortality and culling (to eight weeks), the inbreds compared favorably with R. O. P. stock.

For the 1950 season, approximately 90 full brother-sister matings have been made. Each of these matings is kept in an especially made breeding coop 24"x24"x36" with a wire partition containing a sliding door, dividing the coop into two pens — one for the male the other

for the female. To date, four inbred settings have been made and one hatch taken off. As this generation of chicks will be 37 1/2 per cent inbred or higher, their performance will be carefully studied and analyzed during the year. —B. A. TOWER AND C. W. UPP.

Poultry Breeding Project

The important Poultry Breeding Project marked its ninth birthday during 1949, and this was the first year that sexed chicks could be sold during the entire season. This was an important contribution of the Breeding Project management to the poultry industry, and it was done at no additional cost. As the chick sexor is now a Poultry Staff member, all chicks sold during the 1950 season again will be sexed.

A total of 9,700 R. O. P. chicks were hatched during the 1949 season. Most of these were sexed and a large percentage of the males were sold. Some buyers also ordered several hundred sexed pullet chicks.

During the 1948-49 R. O. P. candidate year, 551 New Hampshires, 360 White P. Rocks, and 125 Barred P. Rock pullets were trapnested. Several additional promising New Hampshire families were discovered. Also it should be brought out that eggs and breeding stock from some of the best private R. O. P. New Hampshire, Barred and White P. Rock breeders in the U. S. were purchased during 1948-1949 to bolster the breeding program of the project. This stock is already exerting its influence on the poultry industry of Louisiana.

—B. A. TOWER AND C. W. UPP.



The operation of wingbanding pedigree-hatched chicks is shown in the above picture. The key step linking one generation with the next is pedigree hatching and banding of chicks. The eggs of each hen are identified by means of the trapnest at the time they are laid. The eggs of each hen, fertilized by a known sire, are hatched in a separate compartment, thus all in it are brothers and sisters. Each chick is given an identifying wingband which it retains for life. Careful performance records are made for each individual and these are assembled by families. Average family records, rather than those of individuals, are the important criteria in breeding for improvement.

Rural Sociology

The Availability of Doctors, Dentists, and Nurses in Rural Areas of Louisiana

It has long been recognized that rural people are at a relative disadvantage from the standpoint of the availability of medical personnel. The awareness of this differential was accentuated by the conditions arising out of World War II. In some rural areas, the entry of doctors into the armed forces left the people completely without professional medical care. The termination of the war, with the subsequent return of many doctors, dentists, and nurses to civilian life, has undoubtedly alleviated the shortages in particular sections. In

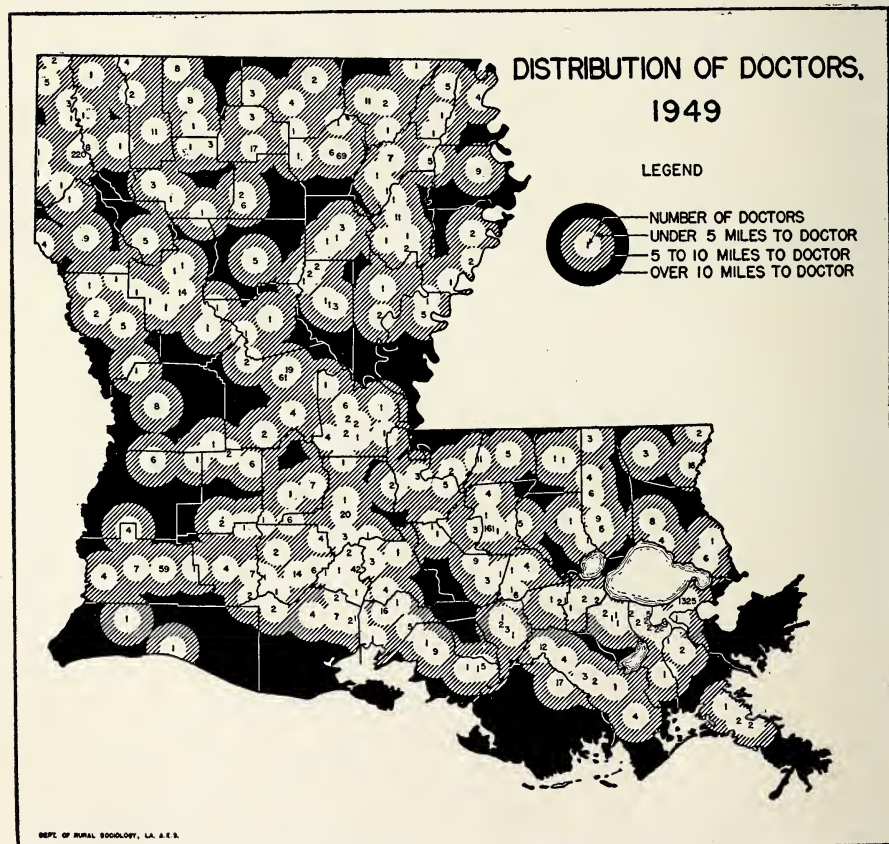


FIGURE 1. Distribution of doctors, by community, indicating accessibility to rural areas, Louisiana, 1949.

connection with our general and continuing study of the social aspects of rural health, research is now being conducted to determine the present status of the supply of medical personnel in rural areas and to ascertain the nature of trends which have developed since the cessation of hostilities and general demobilization.

The following statements briefly summarize the findings to date. A total of 2,687 doctors were certified to practice in Louisiana in 1949. For the entire state, a slight improvement has occurred in the ratio of persons per doctor between 1946 and 1949, the figures being 963 and 955, respectively. This indicates that practicing physicians have increased somewhat more rapidly than the population of the state during this three-year period.

An analysis of the variations among the parishes of the state in 1949 reveals significant differentials. Parishes with the fewest persons per doctor in 1949 were Orleans (408), Caddo (728), East Baton Rouge (749), Ouachita (882), East Feliciana (948), and Rapides (968). The largest ratios prevailed in the following parishes: St. Bernard (12,134), West Feliciana (5,145), Grant (5,044), West Baton Rouge (4,288), East Carroll (4,235), and Catahoula (4,211). In general, the parishes with low ratios of persons per doctor were the most urban in Louisiana except East Feliciana in which the presence of a large state-supported mental institution serves to reduce the figure. Figure 1 clearly shows the areas of the state which had relatively little access to a physician in 1949.

In 1948 there were 976 dentists certified to practice in Louisiana. The ratio of persons per dentist for the state was 2,637. The ratio in 1946 was 3,402. Dentists in civilian practice thus have been increasing at a relatively faster rate than the state's population. Parishes having the lowest number of persons per dentist in 1948 were as follows: Orleans (1,383), East Baton Rouge (1,812), Caddo (1,957), Claiborne (2,066), and Lafayette (2,205). Three parishes, Plaquemines, St. Bernard, and St. Helena, did not have a single dentist. Extremely high ratio of persons per dentist were found in Sabine Parish (21,335), Livingston Parish (20,050), Grant Parish (15,131), Red River Parish (12,054), and West Feliciana Parish (10,290). In general, as was the case in regard to availability of doctors, the more urban parishes had a much lower number of persons per dentist than the rural areas.

Louisiana had a total of 6,060 registered nurses in 1949. The ratio of persons per nurse for the state was 423. The corresponding ratio for 1946 was 467. This indicates that the increase in the number of registered nurses has more than kept pace with the population growth in the state. However, there was great variation in the number of persons per nurse by parishes. The lowest ratios in 1949 were recorded in Orleans Parish (211), Caddo Parish (232), East Baton Rouge Parish (234), Rapides Parish (256), and Ouachita (272). St. Helena Parish does not have a single registered nurse. High ratios

were found in West Feliciana Parish (5,145), Cameron Parish (5,788), Red River Parish (6,027), and Catahoula Parish (6,317). Generally, low ratios were found in the urban parishes, while the rural areas were characterized by the largest number of persons per nurse.

A comparison of the distribution of medical personnel in the state in 1946 and 1949 discloses a significant and somewhat alarming trend. The more urban areas which were in a relatively favorable position in 1946 insofar as the availability of medical personnel was concerned had improved their situation by 1949. On the other hand, the rural areas which showed high ratios of persons per doctor and per nurse in 1946 had actually lost ground in this respect. A slight improvement, however, occurred in the supply of dentists among the rural population. This trend indicates that the already disadvantaged position of rural areas in Louisiana has deteriorated somewhat farther in the past few years insofar as the availability of physicians and nurses is concerned. —HOMER L. HITT AND PAUL H. PRICE.

Radio Habits in Rural Louisiana

The analysis of the listening patterns and program preferences of farm people in Louisiana has been completed. Among the major conclusions reached since last year's Annual Report are the following:

(1) The farm people in Louisiana have definite radio program preferences. As a whole, their favorite daytime program is news. Second among their day preferences are musical programs. At night they prefer music first and comedy and variety programs second. In connection with the day and night popularity of musical programs, it is significant that the greatest interest is in "Western" and "Hillbilly" types of music. Other programs in which keen interest is manifested include market and weather reports. Interest in County and Home Agent's broadcasts, though substantial, is considerably less pronounced than for the above types of programs.

(2) The rural audience has a definite preference concerning certain aspects (other than content) of a farm program. It is evident from the data assembled that a 15-minute program in which two or more persons take part and which originates from the farm is favored. In addition, considerable numbers of farm people who had tried to take down a recipe or formula had had difficulty in doing so. This fact may possibly indicate a need for more effective methods of presentation. The statements of informants in South Louisiana leave no doubt but that they have a preference for French language programs. Although only a few farmers own FM-equipped radios, a considerable number of them expressed the intention to acquire such sets.

(3) Farm people of Louisiana have more interest in broadcasts dealing with subjects included under the general topic of homemaking

and health than under any other. Many, however, desire information falling within such broad categories as livestock, poultry, and dairying; farm practices and management; crops; and home gardening.

—ALVIN L. BERTRAND AND HOMER L. HITT.

The Level of Living of Louisiana Farm People

During the year the study of levels of living among Louisiana farm people has been continued and expanded. Level of living has been measured by a series of indexes based on characteristics or items possessed or used by people because they contribute to health, comfort, convenience, or social participation. In all, some fifteen indexes have been utilized.

This analysis is composed of three distinct sections which are:

1. Comparison of farm levels of living in Louisiana with those in the Southern Region and the Nation.
2. Comparison of farm and nonfarm levels of living in the state.
3. A study of variations among the parishes in farm levels of living.

Since a previous reporting has summarized the first phase of the study, remarks here will be confined to parts two and three. The accompanying chart compares farm and nonfarm populations of the state by race on the basis of five selected indexes. (See Figure 2.) A clear cut advantage, with respect to these and all other indexes calcu-

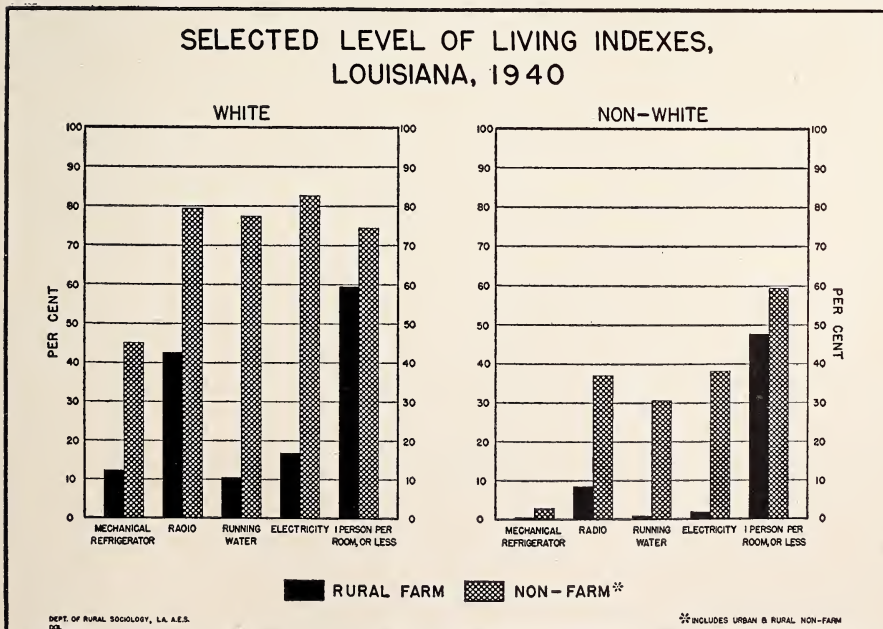


FIGURE 2. Percentages of farm and nonfarm households reporting five level of living items, by race, Louisiana, 1940.

lated, was enjoyed by nonfarm residents over those persons who live on farms. A similar advantage was held by whites over nonwhites, irrespective of residential classification. Among nonwhite families, only 0.3 per cent of those on farms owned mechanical refrigerators, while 2.8 per cent of those in nonfarm areas possessed this convenience. The corresponding percentages for white persons, 12.3 and 45.1, though of greater magnitude, exhibited a similar residential differential. Less than one-tenth (8.4 per cent) of the nonwhite farm households reported ownership of a radio, as compared with almost two-fifths (37.0 per cent) of the nonwhite households not on farms. These two proportions among white families were 42.6 per cent and 79.5 per cent, respectively. Farm whites thus ranked above nonfarm Negroes with respect to the possession of radios, but within each racial group fundamental residential differential prevailed. Observation of Figure 2 will reveal the extent of the advantage of nonfarm people in these and such other indexes as running water, electric lighting, and relative degree of crowding.

A similar residential pattern was evident with respect to formal education. Among white persons 25 years of age and over, two and one half times as many farm as nonfarm people had not completed a single grade of school. Among the nonwhite adults the proportion of persons not finishing the first grade of school was 1.5 times greater for farm than for nonfarm residents. Moreover, among the whites, more than five times as many nonfarm as farm adults had completed high school. Among Negroes this ratio reached 15:1.

The variations in farm living levels among the parishes are still under study and it is not yet possible to make conclusive statements on this subject. However, a number of patterns and relationships are already emerging from the analysis. For example, the data show that parishes with the highest levels of living for farm people are those in relatively close proximity to large population centers. It is apparent that throughout the state a substantial number of persons residing on farms have full or part-time employment away from the farm. A single member of a family with employment in a nearby city may raise the level of living index rating of an entire farm household—if part of the regular cash income is expended on those items that serve as level of living indexes. —JOHN N. BURRUS, LOUISE KEMP AND HOMER L. HITT.

The Social Effects of Agricultural Mechanization in Louisiana

After a two-year lapse, occasioned by insufficient personnel to carry on the project, the study of the social effects of the mechanization of Louisiana agriculture has been resumed. In the state and the South generally, agricultural mechanization had made relatively little progress until recent years. In the 1930's, however, mechanization be-

gan in earnest and set off an apparent "cultural hurricane" bringing far-reaching and fundamental change.

A steady advance in the number of tractors on Louisiana farms occurred during the period from 1930 to 1945. Tractors totaled only 5,016 in 1930, increased to 9,476 in 1940, and finally soared to 17,630 in 1945. The rapid increase which occurred between 1940 and 1945 was, no doubt, closely related to factors associated with World War II. Trucks on farms also mounted by significant numbers. The data show farmers of the state to have owned 9,281 in 1930, 17,005 in 1940, and 20,974 in 1945. As the number of tractors and trucks increased, the number of draft animals on farms decreased. For example, mules on Louisiana farms numbered 200,752 in 1930, 198,748 in 1935, 174,922 in 1940, and 154,217 in 1945.

Widespread social and economic readjustments follow in the wake of agricultural mechanization. One trend reflecting this application of technology is the increase in the size of farms. The average acreage per farm for the state was 57.9 acres in 1930. By 1935, this figure had reached 61.4 acres. In 1940 it had grown to 66.6 acres, and in 1945 it had mounted to the all-time high of 77.6 acres. During this period the cropland per farm had also increased. From an average of 35.9 acres in 1935, this acreage jumped to 40.6 acres in 1940 and to 41.2 acres in 1945.

Many changes in addition to those of an economic nature seem to be taking place. From a questionnaire sent to county agents, it appears that mechanization is associated with an increase in the number of farm owners and a decrease in the number of farm laborers and tenants. In addition changes seem to be underway in governmental and other social institutions, in the composition of the farm population, and in levels of living. A thorough study of these and other social consequences of mechanization, based on a comprehensive field survey, is planned for the coming year.—ALVIN L. BERTRAND.

Sugar Cane

Varieties

Nine new sugar cane varieties were sent to the eight Experiment Station test fields in the fall of 1949: C. P.'s 47-61, 64, 91, 99, 109, 126, 166, 191 and 193. The variety C. P. 47-191 was sent to the Meeker and Shirley test fields only. Twenty preliminary selections of the new plant cane varieties, nineteen of the C. P. 48 series and a foreign importation, N.Co. 310, were sent to the Smithfield Primary Seed Increase Station, which is serviced by the Louisiana Sugar Experiment Station, and ten of these varieties were sent to the Orange Grove Primary Seed Increase Station, which is serviced jointly by this Station and the United States Department of Agriculture Station, Houma, Louisiana. Seed cane of several other new varieties now on our test fields was also sent to these two stations.

We cooperated with the Industrial Committee of the American Sugar Cane League in their new varietal milling program by supplying them with seed cane of six of the most promising unreleased varieties. These were C. P.'s 43-33 and 47, C. P. 44-154, C. P.'s 45-122 and 184, and C. P. 47-193. These varieties are planted on the St. Gabriel farm of the State Penal system, and sufficient mill cane should be available during the 1950 grinding season for running large-scale milling tests, juice clarification and processing tests by the Audubon Sugar Factory in cooperation with the Industrial Committee of the American Sugar Cane League.

Under the three-way cooperative agreement among the Louisiana Agricultural Experiment Station, the Bureau of Plant Industry of the United States Department of Agriculture, and the American Sugar Cane League, two new sugar canes were released for commercial cultivation in the fall of 1949—C. P. 44-101 and C. P. 44-155.

C. P. 44-101 is the more vigorous of the two varieties, is midseason in maturity, and has a satisfactory sucrose content at that time. C. P. 44-155 has proved to be a good field yielder on the more fertile, well-drained soil types of the river area where it has been reasonably early in maturity and has a good sucrose content. Neither of the varieties is classed as high in fiber content. Both have been strong stubblers at the Louisiana Sugar Experiment Station.

It is believed that these new sugar canes will prove to be valuable additions to the present commercial varieties of the sugar district.

In order to have more information available to the industry on the milling qualities of these new varieties, we supplied the Audubon Sugar Factory with sufficient quantities of mill cane of the two varieties for them to run large-scale milling tests, preliminary clarification, and other processing studies. —E. C. SIMON AND F. W. BERTHELOT, JR.

Sugar Cane Test Fields

The variety testing work in 1949 consisted of nine plant cane, nine first stubble and five second stubble fields at eight locations. These were harvested and tested during the regular milling season, from the middle of October through the first week of January, 1950. Final results on the comparative performances of the commercial varieties and most promising new seedlings were obtained from a total of 23 experimental fields.

Evaluation of Varieties (Averages of plant cane and stubble)

Red River Section — Meeker & Shirley (Yahola very fine sandy loam): C. P. 36-105 was the outstanding commercial variety. C. P. 44-101 ranked first at Meeker and third at Shirley. C. P. 44-155 had a higher yield and slightly outranked C. P. 29-320.

Upper Mississippi River Section — Cinclare "sandy land": (1) C. P. 36-105; (2) C. P. 43-3; (3) C. P. 43-9; (4) C. P. 36-13; (5) C. P. 44-101; and (6) C. P. 29-320. The two unreleased varieties, C. P. 43-3 and 43-9, are lower in sucrose than any of the commercial varieties. Cinclare "black land": (1) C. P. 43-3; (2) C. P. 36-105; (3) C. P. 33-224; and (4) C. P. 43-47. C. P. 36-105 was the highest in sucrose and the most profitable for this soil type. In the plant cane tests C. P. 44-101 outranked C. P. 36-105 in tonnage, but was considerably lower from a sucrose standpoint. Other varieties like C. P. 33-224, 43-3, 43-47, and 44-153 gave higher tonnages but much lower sucrose than C. P. 36-105.

Lower Mississippi River Section — Glenwood "sandy land":— (1) C. P. 34-120; (2) C. P. 43-9; (3) C. P. 36-105; (4) C. P. 36-13; and (5) 44-155. The poor performance of C. P. 29-120 and 44-101 is attributable to severe cane borer damages in these two borer-susceptible varieties. Reserve "sandy land": (1) C. P. 44-101; (2) C. P. 43-9; (3) C. P. 43-47; (4) C. P. 36-13; and (5) C. P. 36-105. C. P. 36-13 was the highest in sugar per ton, while C. P. 43-9, which was the lowest, ranked second at Glenwood and Reserve and third at Cinclare.

Teche Section—Caffery (Baldwin silt loam): (1) C. P. 43-47; (2) C. P. 44-155; (3) C. P. 36-105; (4) C. P. 36-13; and (5) C. P. 43-3. The varieties C. P. 44-101 and F. 31-762 ranked sixth and seventh respectively. Co. 290 ranked ninth.

Western Section — Billeaud (Lintonia silt loam): (1) C. P. 44-101; (2) C. P. 43-3; (3) Co. 290; (4) C. P. 33-310; (5) C. P. 36-105, and (6) C. P. 36-13. C. P. 44-155, which ranked eighth, was second highest from a sucrose standpoint and lowest in tonnage. Youngsville (Olivier silt loam): (1) C. P. 44-101; (2) C. P. 43-47; (3) C. P. 44-153; (4) C. P. 44-155; (5) C. P. 36-105; and (6) C. P. 43-3. Co. 290 ranked third from a tonnage standpoint, and was lowest in sucrose as plant cane on account of a badly lodged condition.

Fall Planting of Test Fields

During the period September 15 through October 20, new variety test fields were planted. Nine experimental fields averaging 2.95 acres in size and totaling 26½ acres were planted at the eight test field locations. At each of the eight locations, the following eight new varieties were planted on a small-plot basis: C. P. Nos. 47-61, 47-64, 47-91, 47-99, 47-109, 47-126, 47-166, and 47-193. An additional variety, C. P. 47-191, which is very small in diameter and high in sucrose, was planted only at Shirley and Meeker, for the purpose of testing this type of cane in these northern localities of the cane belt.

Promising New Varieties

C. P. 33-224 continues to make a favorable showing on the Cinclare Sharkey type soil, and on Iberia silt loam in some parts of Iberia and Vermilion parishes, where it is being used by one cane grower as the main commercial cane and on a field trial basis by numerous growers.

F. 31-762 outranked Co. 290 in the Teche area. Results showed higher yields of sugar per acre.

C. P. 43-3 made the best response on Cinclare light and heavy soils, and in the Teche and Western sections.

C. P. 43-9 and C. P. 45-184 showed best in the Red River and Upper and Lower Mississippi River sections.

C. P. 43-33 made a favorable showing as second stubble at Reserve, Meeker, and Shirley, but was very poor in one plant cane test. This variety seems to be in the class with C. P. 36-19.

C. P. 43-47 made a good showing in the Upper and Lower Mississippi River, Teche and Western sections.

Two new varieties, C. P. 44-101 and 44-155, were released for commercial planting in the fall of 1949. The test field results indicate that in a total of 17 tests of the five representative sections of the sugar cane belt, C. P. 44-101 outranked C. P. 36-105 eleven times; while C. P. 36-105 surpassed C. P. 44-155 thirteen times.—C. B. GOUAUX.

Veterinary Science

Gastro-Intestinal Parasites of Cattle

Further experiments have been conducted during the past year to determine the effectiveness of small amounts of phenothiazine in the control of parasites of calves, and specifically in pure infections of the nodular worm. One and one-half grams were fed to four animals in the daily grain ration for six days. Three of the four animals became free of eggs and larvae in the manure in from one to two weeks after the first feeding and the other calf required a second feeding to eliminate the eggs. Since a second feeding was necessary in the case of one animal, it was decided to continue the feeding for 14 days. By feeding 14 days instead of 6 days, all of the four animals became free of eggs and larvae within two weeks after the first feeding. The calves remained free of eggs and larvae from 24 days to as long as 14 weeks and the number of eggs recovered in the latter period was much lower than before feeding the phenothiazine.

Certain changes can be detected microscopically in the nodular worm eggs in from 10 to 16 hours after the first feeding of phenothiazine, and infective larvae are absent from the manure from the time of the first appearance of abnormal eggs. These changes in the eggs consist of abnormalities in cell divisions and in the appearance of brownish pigment within the protoplasm.

As a result of these experiments the use of phenothiazine in small amounts in heavy nodular worm infections might be beneficial in reducing the number of eggs and infective larvae about the premises. In this manner the possibilities of reinfection and of infection of younger animals is reduced. This is of importance since the symptoms and losses due to nodular worm infection are caused by the larval stages rather than the adult parasite.

The results are similar to those obtained in previous experiments with the hookworm in that infective larvae are not recovered from the manure during the time of feeding the phenothiazine. The effect on hookworms is different, however, in that egg production is not stopped and infective larvae are again recovered as soon as the phenothiazine feeding is discontinued.

Some preliminary experiments have been carried on since June, 1947, to determine the amount of phenothiazine calves will consume in a salt-phenothiazine mixture while on pasture. The mixture used was 1 part phenothiazine and 10 parts of salt. These data up to the present time indicate that the calves consumed widely varying amounts at approximately monthly intervals. The animals consumed 1.2 to 2.5

grams of phenothiazine per day during alternating months. The consumption during the other month was 0.18 grams or less per day. This information when compared with the effects of phenothiazine on eggs and larvae under experimental conditions indicates that phenothiazine-salt mixtures offered free choice possibly would be beneficial in controlling nodular worms, but the animals would not get enough of the drug to control hookworm infection all the time as continuous intake is necessary. —ROY L. MAYHEW.

Johne's Disease (Paratuberculosis)

Johne's disease or Paratuberculosis is a chronic infectious disease of cattle, sheep, goats and deer. The causative agent is a small rod, *Mycobacterium paratuberculosis bovis*, similar in many respects to the organism causing tuberculosis. The disease is characterized by a profuse diarrhea, emaciation and dehydration. It may be confused with other conditions so a veterinarian should always be consulted for a differential diagnosis.

We are carrying on work with a herd that has been naturally infected since 1925. This gives results which should be comparable to field results. One test of the herd using intradermal Johnin was completed during the year. Those animals evidencing the strongest reactions were injected intravenously and temperatures taken at hourly intervals. No correlation between intradermal and intravenous reactions was observed in these tests.

Three tests were run on calves during the year and some animals were tested as many as three times. Calves in individual pens on clean premises were negative to all tests. After four months of age these negatives calves were turned out on pastures that had harboured infected cattle and a large percentage developed a positive reaction in a few months. This evidence is more conclusive proof that the proper raising of a calf in clean surroundings is imperative to assuring a profitable, disease-free animal.

The work at the Louisiana Experiment Station is being correlated with the work being carried on at the Regional Animal Disease Laboratory at Auburn, Alabama.

It is planned in the coming year to continue testing of the newborn calves and follow up testing of others, particularly the reactor calves. We want to find out what percentage of reactor calves will develop clinical Johne's disease. Although the incidence of Johnin reactors and clinical cases in this herd has been on the decline the past couple of years, no prediction can be made for its future course. We want to continue our studies on the correlation of intradermal and intravenous injections of Johnin to aid in developing a better method of diagnosing this slowly progressing disease.

—R. B. LANK AND W. T. OGLESBY.

Pullorum — Typhoid Complex in Chickens

The bacteria causing pullorum disease and fowl typhoid have given identical results in all blood tests which have been based on immune bodies in the blood. Because of this factor, no reliable blood test has been developed to differentiate these two diseases. Work is now being directed toward comparative study of fractions of the bacterial bodies with intention of learning if there are differences in these components. These procedures may produce evidence of differing factors in the two microorganisms which may aid in clinical differentiation of pullorum disease and fowl typhoid.—C. H. BRIDGES AND HELEN E. LEVY.

Treatment of Pullorum Disease in Chicks

During the early part of 1949 studies on the value of sulfamethazine, sulfaquinoxaline, and 4,4' diaminodiphenylsulfone as prophylactic and therapeutic agents for controlling pullorum disease mortality were completed. Sulfamethazine and sulfaquinoxaline were apparently effective in reducing mortality from pullorum disease in chicks under laboratory conditions. 4,4' diaminodiphenylsulfone was not effective in reducing the mortality at the concentrations used in this study. Sulfaquinoxaline was apparently more effective when used in the drinking water than when given in the mash.

None of the drugs tested was effective in reducing the number of reactors to the whole blood agglutination test for pullorum disease. The rate of growth was adversely affected in infected chicks, and none of the drugs tested was significantly effective in preventing this retardation of growth.—L. C. GRUMBLES AND HELEN E. LEVY.

Substations

Fruit and Truck Experiment Station, Hammond

W. F. WILSON, JR., *Superintendent*

Control of Weeds in Strawberry Fields

At the present time considerable hand labor is required to control weeds in strawberry fields. Tests made over the last three seasons have shown that the use of herbicides offers considerable promise to the growers in the handling of this problem. By spraying the middles with 2,4-D immediately after scraping, weed growth can be controlled. In addition pre-planting sprays of 2,4-D and dinitro herbicides have been found to hold back the initial growth of weeds in the row and thereby materially reduce the labor necessary to scrape. If the spraying is properly timed, the strawberry plants are not injured. Possibly, general recommendations on the uses of herbicides can be made when the results are obtained on the tests in 1949-50.

—W. F. WILSON, JR., E. R. STAMPER, T. C. RYKER AND L. E. COWART:

Cucumber Varieties

Several standard varieties and the new mildew resistant strains were compared the past two seasons under conditions involving control and no control of mildew. The variety Palmetto is highly resistant to mildew and will produce a crop without the use of a control for this disease. The additional cost of a fungicide added to the dust used for control of insects is very small, and under the recommended dusting program the Marketer, a mildew-susceptible variety, produces the greatest yields of marketable cucumbers. Palmetto does not produce vine growth of the standard varieties and is later maturing. Other resistant strains not yet released by the South Carolina Station produce larger yields than the variety Palmetto.

Blueberry Breeding

In cooperation with Dr. G. M. Darrow of the United States Department of Agriculture a large number of seedlings of blueberries or huckleberries from controlled crosses have been grown by this station.

Selections designated L-6, L-8, L-9, L-10, L-11, L-12 and L-13 have been increased for further testing and propagation as named varieties adapted to this area.

Named varieties of blueberries and selections from other Southern states are also being grown and observed in the planting. The varieties Black Giant and Meyer are the best of the named varieties tested but are not as desirable as the Station selections that are being propagated.

Strawberry Varieties

A previous report gave information on the naming and distribution of the variety Marion Bell. During each of the last four years this variety has produced an average yield of 218 crates per acre during the shipping season in comparison with 174 crates per acre from the Klonmore. Last season the yields for these two varieties were: Marion Bell, 219 crates; Klonmore, 157 crates per acre.

In addition to these indicated advantages, the variety Marion Bell produces a most attractive fruit for the market, owing to coloring of the entire berry and the high degree of lustre or gloss of the ripened fruit.

Cucumber Fungicide Tests

A number of fungicidal dusts have been tested at the Fruit and Truck Experiment Station and on commercial farms for the control of downy mildew and anthracnose. On the basis of the 1949 tests and those of previous years the following observations summarize the cucumber disease problem.

1. Downy mildew, the ever-present and most serious disease of fall cucumbers, has been effectively and economically controlled with dusts containing one of the commercial copper materials, such as Tri-Basic Copper Sulphate or Copper A.

2. Anthracnose is a somewhat sporadic disease but when favored by rainy weather causes very severe damage. The copper materials when used as dusts or sprays give rather poor control of anthracnose.

3. Although dusts containing one of the copper fungicides give good control of downy mildew and often result in very good yields, they often give disappointing results when anthracnose becomes severe.

4. On the other hand, some of the organic fungicides have been found to give good control of both anthracnose and downy mildew. Fermate, Dithane Z-78, and Parzate have given good control of both of these diseases without injury to the vines.

5. Bordeaux mixture is less satisfactory than the commercial organic fungicides, such as Fermate. It not only does not control anthracnose satisfactorily but also injures the vines.

6. In order to control both diseases and insects and also to obtain profitable yields, dusts containing a fungicide such as Fermate, Dithane Z-78, or Parzate, and the insecticides cryolite and nicotine (Black Leaf Dry Concentrate or Black Leaf 10) should be thoroughly applied at intervals of three to five days beginning a few days after emergence of the young plants and continuing until shortly before the end of the picking season.—J. G. ATKINS, JR. AND W. F. WILSON, JR.

North Louisiana Experiment Station, Calhoun

RALPH S. WOODWARD, *Superintendent*

JOHN C. TAYLOR, *Research Associate in Horticulture*

J. L. HEATH, JR., *Research Associate in Animal Industry*

The research program of the North Louisiana Experiment Station was expanded in 1949. Two outfield corn experiments, and a sweet potato fertilizer test were started on farms of cooperators in Union Parish, and an outfield sweet potato fertilizer test was located in Ouachita Parish. On the station proper, an experiment on corn interplanted with soybeans, and a thrips control test with cotton were established. In addition to this, approximately 20 acres of hitherto unimproved pasture and a like amount of untilled land were brought into a new pasture study. These fields were put under fence, and weighing and penning facilities built in order that production records could be kept. Initial work has begun towards developing a 20-acre woodland pasture that is designed to provide the maximum utilization of the existing stand of pine timber and to afford as much grazing as possible. This project should be well underway by 1951.

Agronomy Research

Corn Fertilizers

In 1949, which had sufficient rainfall throughout the corn season, a 90-30-30 formulation led in production with 63.5 bushels per acre, a 90-30-60 was second with 60.5 bushels, a 60-30-60 was third with 59.0 bushels, and a 60-30-0 was fourth with 56.6 bushels. The effects of phosphate and potassium during a wet season such as 1949 were not so great, as is shown by a 60-0-0 which was sixth in the test with 55.7 bushels as compared with a 60-30-30 which was fifth in the test with 56.3 bushels per acre. The past experiments in this plot have indicated that a 60-30-30 was probably the most economical to use under 24-inch spacing on a 40-inch row. In 1949 the difference of 7.2 bushels per acre between a 60-30-30 and a 90-30-30 would just about pay for the added nitrate at the latter rate.

Corn Fertilizer and Spacing Test

The highest yield in this test was from a 120-0-0 at 18 inches spacing on 40-inch rows. While this was not significantly greater than either a 90-0-0 or a 90-40-40, it does mark a trend of thinking that higher yields can only be obtained by increased plant population along with the higher rates of fertilization. The average yield for all fertilizer treatments was 60.4 bushels per acre at 18-inch spacing on 40-inch rows, 57.1 bushels at 24-inch spacing on 40-inch rows, and 52.8 bushels at 30-inch spacing on 40-inch rows. At 18-inch spacing, 60-0-0 produced 58.0 bushels while a 120-0-0 produced 70.0 bushels and a 90-0-0 produced 67.1 bushels per acre. It is indicated from these figures for 1949, which was a year of ample rainfall, that there is a maximum point of nitrate application even at the closer spacings.

Corn Spacing Experiment

This experiment has run for some time, and the 1949 data further confirm results of past years. The plots are uniformly fertilized with 1300 pounds of 6-8-8 plus 36 pounds of nitrogen per acre, making the total application 114-104-104 per acre. La. 468 is planted on 40-inch rows at 18-, 24-, and 30-inch spacings and replicated three times. Results in 1949 were an average yield of 80.3 bushels at 18-inch, 78.0 bushels at 24-, and 71.6 bushels at 30-inch row spacings, respectively. The yields increased sharply from 30 to 24-inch spacing in all plots but less markedly in the step from 24-inch to 18-inch spacing.

Corn-Soybean Experiment

In an effort to get definite facts on the effect of interplanted corn and soybeans on soils in North Louisiana, under current conditions of hybrid corn varieties and present corn fertilizer practices, this test was begun in 1949.

Seven treatments were involved in the comparison of corn alone annually and corn and cotton in alternate years; corn and beans in alternate hills annually and rotated with cotton every other year; corn and beans in alternate rows annually and rotated with cotton in alternate years; and cotton planted annually. All corn, and corn and beans were to be fertilized the same and with the same corn population per acre. All cotton plots will get the same annual treatment when planted to cotton.

Results in 1949 show corn alone averaged 60 bushels per acre, corn and beans in alternate hills 43.7 bushels per acre, and corn and beans in alternate rows 27.4 bushels per acre. The cotton plots averaged 1795.4 pounds of seed cotton per acre. This is the first year's results, and no conclusions can be made until further work is done.

Outfield Corn Fertilizer Test

This test, located on the farm of J. C. Nash, Lillie, La., was begun in 1949. While no conclusion can be drawn, it is interesting to note that on Mr. Nash's soil, which is an Orangeburg sandy loam, the fertilizer picture varied sharply from that on the station proper, which is also an Orangeburg soil. The best yield was 56.4 bushels from a 60-60-30; second best was 53.1 from a 90-30-30; third was 48.6 from a 60-30-60. A 16-0-0 produced 28.4 bushels; a 32-0-0 produced 29.4; while a 26-20-10 produced 40.1 bushels and a 60-30-30 produced 41.4 bushels. The results, while inconclusive, indicate the importance of a balanced fertilizer program for corn. This test is to be continued.

Corn Variety Experiment

This phase of work is unchanged and the results are much the same as in the past. The Louisiana hybrids are still producing better yields than the open-pollinated varieties. Dixie 11, Dixie 17, Louisiana 468, and Funk's G-714 are still the leading varieties for the hill section in both yield and quality of corn produced. Some other varieties appear about as good as these in yield, but the quality and soundness of the ear is not quite as high as those listed.

Outfield Variety Test

The test was located on Mr. Nash's farm also. It consisted of the leading hybrids and open-pollinated types grown in this area. The 1949 results were: Dixie 11, 66.1 bushels; La. 468, 59.1 bushels; Dixie 17, 58.2 bushels; Funk's G-714, 54.1 bushels; Jarvis Prolific, 51.7 bushels; Hills Yellow Dent, 46.9; and Calhoun Red Cob, 42.4 bushels. This test will be continued.

Crop Rotation Experiment

The 1949 results from this old plot are about the same as in the past years. The results were as follows in acre yields: phosphate and manure—39.5 bushels corn and 947.0 pounds seed cotton; 500 pounds 6-8-6—21.9 bushels corn and 656.6 pounds seed cotton; no fertilizer—4.9 bushels corn and 62.8 pounds seed cotton.

It is evident that soils that have been continuously cropped with no added plant food eventually reach a point in which the soil is unable to support enough growth to produce organic materials for its maintenance. On the other hand the plots that receive 12 tons barnyard manure plus phosphate have gradually increased in production and have annually produced more crop refuse than the other plots.

—RALPH S. WOODWARD.

Pasture Studies

Woodland Pasture

A 21-acre woodland area that joins the present cattle pasture north of Highway 80 is being cleared for research purposes. In 1949 the hardwood trees and all underbrush were cut and piled in preparation for removal of all marketable timber, pulp wood and fence post material. This work is under supervision of the Forestry Department. Accurate cost records are being kept as well as all returns from this area. The overall purpose is to determine if it is practical, following the practices of good forest management, to produce pasture and pine timber on the soils of North Louisiana.

Sand Hill Pasture

Approximately 13 acres of idle land that is largely composed of a steep, coarse, sand hill was planted to hairy indigo in the spring of 1948. Owing to weather conditions this planting failed. In the fall of 1948 crimson clover was sown to the hill area of this pasture only. In mid-April 1949, nine Devon cattle, cows and calves, were turned on this area and kept on until after the clover seeded and matured. These cows were not weighed when put on or when taken off, but all gained in flesh and condition from the clover, which was the only forage available. The hill was planted to indigo after the clover matured, but in spite of good moisture conditions, this indigo failed to make satisfactory growth although a fair stand resulted. Crimson clover, while not making as rank a growth on this pasture as in other locations, seems well adapted to this deep, low fertility soil and offers definite promise as a pasture crop on similar soils in North Louisiana.

—RALPH S. WOODWARD.

Dairy

The dairy program is unchanged and the only research that is in progress, or has been for the last few years, is the grazing of various crops and the influence on milk production of the crops grazed. During the summer of 1949 cows on Sudan averaged 28.1 pounds per day, on permanent pasture 24.3 pounds per day, and on kudzu 24.1 pounds per day. The cows were on test from July 11 until August 6, inclusive. In the spring of 1949 oats and crimson clover were compared with permanent pasture (largely clover at that stage) and with alfalfa for early spring grazing. The test began March 1 and ended March 29. The cows on alfalfa averaged 25 pounds per day as compared with 24.0 pounds for oats and 24.8 pounds for permanent pasture. Those on the oats and clover pasture did not molest the clover but confined their grazing entirely to oats. The cows on permanent pasture ate clover almost entirely since the only other forage was dry Bermuda grass. The oats could have been grazed much earlier but because of wet, soft soil conditions it was necessary to keep them off the field.

Alfalfa proved to be a valuable asset to the dairy program. It furnished a much needed green forage during the dry fall months of 1948 and again during the early spring months when permanent pasture was not sufficient. In addition to the grazing furnished during the fall of 1948 and the spring of 1949, four acres of Oklahoma Common alfalfa produced 408 bales of good quality hay. These bales varied in weight from 65 to 75 pounds and averaged 68 pounds. The above production was from a 1947 fall seeding that was "spot" seeded in the thin places in May 1948 to establish a uniform stand. Fair production was realized in the 1948 season, but owing to weather conditions, only one cutting of hay, 115 bales, was recorded. Alfalfa, while seemingly expensive to grow, is a perennial crop that is affected less by fall drought than any grass or legume. It is valuable at this season for supplemental grazing, and under good management will furnish moderate hay yields. Work will continue with this crop.

—RALPH S. WOODWARD.

Horticulture

Fertilizers for Sweet Potatoes

This work was continued as in 1947-48 using identically the same treatments. Outfield tests were conducted in both Union and Ouachita Parishes, and the results of the 1949 season, while not conclusive, are similar to other experiments. Best yields were obtained from the use of a 1-2-2 ratio up to and including 30 pounds of nitrogen and 60 pounds of phosphate and potash. When this amount is increased to 40-80-80 there is a decrease in yield of marketable potatoes. Based on the results of the past three years' research, the recommended fertilizers to use on table stock sweet potatoes in the hill section of Louisiana are: 20-30 pounds of nitrogen, 40-60 pounds of phosphate, and 40-60 pounds of potash. These amounts may be best supplied by using 400-600 pounds of 5-10-10 or 500-750 pounds of 4-8-8 per acre.

Watermelon Research

The purpose of this project is to develop, or to obtain from some outside source, a good marketable variety of melon which has good quality and a very high degree of wilt resistance. The Brownlee is the best wilt resistant variety that we have tested. Several seedlings which were developed on the North Louisiana Experiment Station are very promising from the standpoint of quality and wilt resistance. Two of these are of the popular Black Diamond type.

The Black Diamond variety is recommended for commercial production on wilt-free soils but should be replaced by Brownlee on soils that are infested with the wilt organism.

Sweet Corn Varieties

Thirteen varieties of sweet corn were grown in a yield test. The varieties were divided into two different groups based on date of maturity. Of the early varieties, Aristogold Bantam Evergreen excelled with a yield of 4,146.9 pounds per acre, having an average weight of .349 pound per ear. Of the later varieties Gulf Coast produced 5,682.1 pounds per acre, with an average weight of .417 pound per ear. This latter variety also had the smallest amount of ear worm damage. Both of the above are yellow varieties. The spacing in this test was 18 inches in the drill on 40-inch rows. Fertilizer used was 600 pounds of 6-8-8 plus 200 pounds of nitrate of soda per acre.

Tomato Fertilizers

This test was begun in 1948 but because of the severe drought conditions prevailing throughout that season it was believed that the results were of no significance. However, the results did not differ greatly from those obtained in 1949. The greatest total yield, as well as marketable yield, has been obtained from the use of 80 pounds of nitrogen, 120-160 pounds of phosphate, and 80 pounds of potash per acre. This amount may be supplied by using 1600 pounds of 5-10-5 per acre.

Garden Pea Varieties

In addition to a variety test which was begun in 1948, this station also conducted the Southern Cooperative trials. Several entries in these trials looked very good from the standpoint of yield and quality, but further tests are necessary before these may be released to the public. Based on results of two seasons' studies of the garden pea varieties the following are recommended: the Yukon for early production, Premium Gem for midseason, and either Canner King or Loyalty for late production.

Irish Potato Varieties

This study consisted of a yield test of seven varieties. The two red varieties DeSoto and Triumph gave the greatest yields. These two varieties are recommended for red potato production, and the Katahdin and LaSalle are the recommended white varieties.

Onion and Shallot Research

The purpose of this work is to investigate the possibilities of growing shallot and Creole onion seed in North Louisiana. The growers in South Louisiana are encountering difficulties in obtaining or growing clean seed to use in production for the fresh market. There is a possibility of producing clean seed in the hill section of the state for sale to the growers in the southern part of the state.

In January, 1948, green shallots from the Angola Prison Farm were transplanted to the field at this station. All the bulbs from this small crop were saved and planted again in November. This planting produced approximately 30 bushels of uncleaned bulbs. One bushel of the cleaned bulbs was shipped to South Louisiana for testing along with the local seed stock. The growers were so pleased with the performance of this seed that they want as much as 500,000 pounds of North Louisiana seed. At present it is impossible to supply any seed to the South Louisiana growers owing to limited supply. The result of this preliminary work is very promising and this project will be continued.

Peach Varieties

The results of the peach variety experiment for 1949 are shown in the following table.

Peach Variety Data, 1949, 5-Year-Old Orchard

Variety	No. Trees	Ripening Date	Marketable ¹			Total Marketable ¹	Culls	Quick Freeze Results ²
			2½" & Up	2-2½"	1½"-2"			
Erly-Red-Fre	8	6-8 ;6-17-49	64.6	15.6	3.2	83.4	3.3	No record
Dixigem	11	6-13 ;6-24-49	69.3	124.8	14.9	209.0	4.0	Excellent
Fireglow	9	6-17 ;6-30-49	125.4	174.0	33.4	332.8	3.4	Good
Early Jubilee	10	6-17 ;7- 5-49	45.6	198.4	91.8	335.8	5.2	Good
Raritan Rose	1	6-17 ;6-23-49	137.4	165.9	34.7	338.0	3.8	Excellent
Red Haven	9	6-21 ;7- 1-49	14.9	25.4	19.0	59.3	5.8	Good
Early Halehaven	10	6-21 ;7- 5-49	70.6	100.2	17.8	188.6	5.2	Fair
Sunhigh	12	6-21 ;7-11-49	66.3	185.2	58.4	309.9	11.6	Excellent
Golden Jubilee	9	6-21 ;7- 5-49	45.2	224.1	72.3	341.6	3.2	Good
Triogem	8	6-21 ;7- 8-49	72.6	96.0	28.9	197.5	2.1	Good
Summercrest	7	6-26 ;7-15-49	31.8	178.8	137.0	347.6	12.4	Fair
July Elberta	10	6-27 ;7-11-49	48.9	208.7	136.4	394.0	11.8	Excellent
Golden Globe	8	6-27 ;7-11-49	15.2	29.1	19.6	63.9	4.8	No record
Halehaven	10	6-27 ;7-11-49	97.9	55.6	5.3	158.8	2.3	Excellent
Colora	12	7-1 ;7-15-49	17.9	117.1	63.6	198.6	4.8	Good
Golden East	7	7-5 ;7-15-49	43.1	84.1	11.3	138.5	0.5	Good
Gleason's Early								
Elberta	10	7-5 ;7-18-49	57.4	89.8	21.3	168.5	3.5	Good
Elberta	10	7-5 ;7-27-49	76.0	110.3	21.8	208.1	2.6	Excellent
Sullivan's Early								
Elberta	10	7-6 ;7-18-49	53.6	146.0	9.4	209.0	3.0	Excellent
Georgia Belle	4	7-8 ;7-18-49	100.0	267.1	47.4	414.5	7.3	Excellent
Afterglow	8	7-25 ;8- 1-49	121.5	132.8	9.5	263.8	15.1	Fair
Early Haven	10	7-1 ;7-11-49	96.6	40.7	1.3	138.6	5.4	Excellent
Lizzie	10	8-1 ;8-15-49	159.0	225.2	11.6	395.8	9.9	Good
Rio Osa Gem	10	7-25 ;8- 8-49	6.8	48.4	46.1	101.3	14.8	Good

¹ Yields expressed in 48-pound bushels per acre.

² Freezing qualities were determined by Dr. E. A. Fieger, Head, Department of Agricultural Chemistry and Biochemistry.

—J. C. TAYLOR.

Poultry

Summary of Hen Feeding Experiment 1942 to 1948

During the war years (1942 to 1945), quite simple laying mashers with single vegetable proteins were used with satisfactory results when supplemented with green feed. A summary of the first three years gave an average production, for ten months, of 141 eggs for the complex mash as compared to 139 eggs for the soybean oil meal mash, 135 eggs for the cottonseed meal mash and 136 eggs for a pen receiving a 32 per cent protein supplement with corn and oats (free choice). All of the pens had green feed on the yards. The single vegetable protein mashers would have been less satisfactory without green feed. More feed was required to produce a dozen eggs in the simple mash pens, and the eggs were smaller. Hens fed the 32 per cent supplement, with free choice grain, consumed less protein (about 13.5 per cent as compared to 15 per cent or more in the other pens).

The simplification of mash was carried to an extreme during the next three years, 1945-1948, when laying mashers composed of one-third soybean meal and two-thirds corn meal were used in one pen, and one-third cottonseed meal and two-thirds corn meal in two other pens. A fourth pen was given a more complex and complete laying mash. The hens on the complete laying mash, over a three-year period, laid on the average three dozen more eggs in ten months than did those fed simple mashers, and an important fact is that in two years out of three most of the difference in eggs laid was during fall and winter months when egg prices are much higher. On the extremely simple mashers egg production averaged 92 eggs per hen in ten months.

Hens versus Pullets

The purpose of the experiment (hens versus pullets) is to determine relative profit that may be expected from old hens as compared to pullets in the first year of production. In the past all-pullet flocks have been advocated widely for farm flock purposes. The advantages claimed are higher egg production, production of more fall and winter eggs (when prices are higher), less disease and lower mortality. To offset these potential advantages are such items as the increased cost of reproducing the entire flock each year, the rapid depreciation of layers (reduced to meat value of the hens in one year) and the possible adverse effects of producing chicks from pullets rather than from older hens.

Two pens of New Hampshire layers, one containing 101 pullets and the other containing 81 old hens, were housed in separate laying pens. Each pen was fed a good commercial laying mash, corn and oats (free choice) with grit and oyster shell in feeders at all times. Alternated outdoor ranges were available with winter, spring and summer green feed crops. In the fall, owing to drought, there was very little green feed in the range yards. The feed, body weights

and eggs produced were recorded (eggs and feed daily; body weights at four weeks periods).

The average feed consumption was practically equal in the two pens. The pullets (over a period of ten months) each consumed 30.8 pounds of mash, 34.9 pounds of corn, and 16.0 pounds of oats, or a total consumption of 81.7 pounds or 8.2 pounds per month. The average consumption of feed (over a period of eleven months) for the hens was 36.0 pounds of mash, 40.4 pounds of corn, and 20.8 pounds of oats, totaling 97.1 pounds or 8.8 pounds per month.

The pullets reached their highest production during December through March, as expected. The hens reached their highest production during February, March and April when eggs were dropping in price. The pullet eggs averaged 24.8 ounces per dozen and the hens averaged 24.5 ounces per dozen.

The fertility for both old hens and pullets was good, 91.7 per cent for the hens and 94.1 per cent for the pullets. However, the eggs of the pullets hatched much better; 87.8 per cent of all eggs set from the pullets hatched, while 70.2 per cent of those from the old hens hatched.

Chicks were hatched and grown to compare hatchability of the eggs and livability of the chicks from two flocks, and to replace the pullet flock at the end of ten months test. The mortality and cull chicks from the two laying flocks were about equal. It cost \$346.93 for feed to grow the chicks to 24 weeks of age, but since the sale of fryers and cull pullets yielded \$418.41 the income margin over feed cost was \$71.48. The pullets averaged 136 eggs valued at \$4.53, while the feed cost per bird was \$3.26. The old hens averaged 88 eggs valued at \$2.92 and the feed cost per hen was \$3.87. The margin of income over feed cost was \$1.25 per pullet, while the expenditure for the hens was 95c greater than the income from eggs. When, in addition to income from eggs, the market value of the pullets and of the cull hens is added to the respective pens and the cost of reproducing each flock is charged against the respective pens, the net income was \$1.60 per pullet and a net deficit of \$1.06 per old hen.

—J. L. HEATH, H. E. HATHAWAY AND R. S. WOODWARD.

Beltsville Small White Turkeys

The small "family size" Beltsville Small White breed of turkey is very popular with the average family in Monroe and Baton Rouge market areas, although there is a good demand in both areas for the larger, broad breasted breed of turkeys.

The Small White turkeys grew off well again this year, although the poults were started late. The first poults received were abandoned, a few days after going into brooders, owing to a highly fatal, unidentified disease that killed practically all of them. Because of the late start the turkeys were not too well finished and fleshed for Thanks-

giving and most of the turkeys were carried over for the Christmas market.

The livability of the Small White has been exceptionally good for the two years grown. Mortality and culling for the first four weeks of 1948 was 5.3 per cent of the 227 poults started in brooders, and in 1949 the loss was 4.0 per cent of 174 poults started in brooders. The mortality for the entire period of 24 weeks was 12.1 per cent.

When the turkeys were eight weeks of age they were divided into three groups of 55, 53 and 51 and put on separate summer ranges. The turkeys on range one were fed growing mash, corn and oats (free choice). The second range group received growing mash and corn chops (free choice) and the turkeys on range three were fed growing mash and oats (free choice). The turkeys on range one consumed 5.66 pounds of feed to produce one pound of turkey. The average weight was 10.4 pounds per turkey. On range two, 4.89 pounds of feed were used to produce one pound of turkey, and the turkeys averaged 11.0 pounds. The group on range three required 5.33 pounds of feed to produce one pound of turkey, and the turkeys averaged 10.7 pounds each. In 1948 it required 4.8 pounds of feed to produce one pound of turkey, while in 1949 5.3 pounds were required. On range one the feed cost per turkey was \$2.44 and the margin of income, over the cost of the poults and of the feed, was \$1.49 per bird. On range two the feed cost per bird was \$2.32 and income over cost of feed and poults was \$1.88 per turkey. In group three the average feed cost was \$2.52. The income over cost of feed and poults was \$1.54 per bird. In 1948 the margin of income was \$2.38 per bird under similar range conditions. The larger income in 1948 was obtained because the turkeys had better grazing, which decreased the amount of feed consumed by each bird. The 1949 turkeys were also much later hatched. The average gain per bird was larger in 1948 and the birds were in better condition at market age.

Ten turkeys from each of the three groups (five males and five females) were graded and dressed to measure the difference, if any, of the three groups at 20 weeks of age for Thanksgiving market. A like number was dressed and graded at 24 weeks for Christmas sale. The dressing percentages were less, 75.6 to 78.0 per cent, at 20 weeks of age than at 24 weeks of age, 78.4 to 80.5 per cent of their live weight. The grades in fleshing and finish were higher in the turkeys at 24 weeks than at 20 weeks of age. Late hatched Beltsville Small White turkeys grown in this section (considering dressing percentage of live weight, fleshing and finish) are ready for the market at 24 weeks or older and should not be sold before they reach that age.

Producers who sell primarily to householders may well consider the Beltsville Small White turkey as one of the best sellers. This conclusion is based upon popular demand of buyers for the years of 1948 and 1949.—J. L. HEATH, CHAS. W. UPP, AND RALPH S. WOODWARD.

Hill Land Pasture Investigations

The North Louisiana Experiment Station, cooperating with the Animal Industry Research Department, began in 1941 a hill land pasture experiment. Twenty-five acres of badly eroded, idle, hill-side land that had been cultivated 70 odd years were divided into five, 5-acre plots. Three plots on the south side were limed and fertilized, while the two north plots were unlimed and not fertilized. After two years' grazing these plots were found to be too small and the three fertilized plots were combined into a 15-acre pasture, and the two unfertilized plots were combined into a 10-acre pasture in 1944.

Fertilizer treatment and beef gains by years are shown in the table below:

Year	15-Acre Pasture (Limed & Fertilized)		10-Acre Pasture (Unfertilized & Unlimed)	
	Fertilizer Treatment	Beef Gains	Fertilizer Treatment	Beef Gains
1944	300# 6-8-4	119.3	None	52.5
1945	300# 3-12-12	285.6	None	106.5
1946	300# 3-12-12	272.6	None	76.0
1947	400# 3-12-12	244.0	400# 3-12-12	127.0
1948*	300# 3-12-12	198.6	300# 3-12-12	51.0
1949**	300# 3-12-12	432.5	300# 3-12-12	208.5
Total	1900# Fertilizer	1552.6	1000# Fertilizer	621.5

*Dry year. The improved pasture was cross seeded to crimson clover, Balboa rye, white Dutch clover, and hop clover in the fall of 1947.

**The north 10 acres of pasture were seeded in fall of 1948 as follows: north half to reseeding crimson clover and the south half to subterranean clover. Five acres of the limed and fertilized pasture were seeded to crimson clover.

The addition of crimson clover to the 15-acre limed and fertilized pasture greatly increased production. In 1948 (an exceptionally dry summer and fall) the beef gain was 198.6 pounds per acre. The first grazing period, April 23 to June 1, produced 142 pounds per acre while the late period, July 16 to September 27, produced only 56.6 pounds. The gain during the first period was the result of the clovers seeded the previous fall, and crimson clover furnished the greater portion, there being little or no forage from either the hop or white Dutch.

In 1949 the results were much the same. The two clovers sown in the 10-acre pasture made excellent growth and produced 145.5 pounds beef per acre from April first through May 15. The limed and fertilized pasture produced 169.6 pounds per acre during the same period. The cattle on the 15-acre pasture were weighed again June 29 and the gain per acre was 186 pounds. This pasture produced 355.6 pounds of beef per acre from April 1 through June 29.

Crimson clover, both reseeding and common varieties, have proved to be well adapted to hill land pasture development.

—CHAS. I. BRAY, J. L. HEATH, JR., RALPH S. WOODWARD,
AND RICHARD FULLER.

Hogging off Crops

In 1943 a program of hogging-off various crops was begun. During the years of this experiment, corn alone, corn and soybeans, and sweet potatoes have been used to finish off spring pigs. In most cases the brood sows have been dry-lot fed during fall and early winter and put on oats at farrowing time.

Hogging-off corn has shown a three-year average of 739 pounds of pork per acre from an average yield of 58 bushels, or 14.3 pounds of pork per bushel of corn. All pigs on these hogging-off tests received one-half pound protein supplement per day per pig.

Sweet potatoes were grazed three years and the average production of pork was 276 pounds per acre from potatoes yielding 110 bushels per acre. Feed (starchy) potatoes produced 312 pounds pork per acre compared to 290 pounds per acre from table stock potatoes.

In 1948 sweet corn was added to the crop program to furnish late spring and early summer grazing. In 1948, 2 1/2 acres of Truckers Favorite sweet corn produced 839 pounds of pork in 28 days. In 1949, three acres of Aristogold Bantam Evergreen corn produced 535 pounds of pork gain in 15 days (June 27-July 12). The use of early maturing corn, followed by field corn shows promise and work will continue on this crop.

In 1949 corn and soybeans as a hogging-off combination were compared with corn alone. The test was inconclusive and the results are being withheld until a second test can be made.

—J. L. HEATH, JR., C. I. BRAY, AND RALPH S. WOODWARD.

Beef Cattle

In order to utilize the increased pasture facilities on the station farm and to build up the beef cattle work, 12 head of red Afrikaner x Angus cows were obtained from the United States Department of Agriculture Animal Breeding Laboratory, Jeanerette, Louisiana. These cows, together with a young bull, were transferred to this station in the fall of 1949 through a loan agreement with the U. S. D. A.

The Afrikaner x Angus cows will be bred to a Devon bull and growth records obtained on the calves. These calves (Afrikaner x Angus x Devon) will be compared to purebred Devon calves and to the one-half Afrikaner-Angus calves. The development and hardiness of the Afrikaner-Angus cows will be compared with that of the Devon cows throughout the year. In addition to the Afrikaner x Angus x Devon breeding work, it is planned to use the young Afrikaner-Angus male on some grade Jersey cows on an adjoining farm in order to observe the type of offspring resulting and to compare the growth and development of these with crossbred Hereford-Brahman calves.

The Devon herd is to be maintained as a purebred herd and increased by keeping all female calves, and if possible, adding one or

two mature cows from time to time. Growth and development records will be kept on the Devon herd as a matter of comparison with the calves from the above mentioned crosses.

All of the cattle will be used to graze off and check the productivity of both the old and new pastures at the station.

—J. L. HEATH, JR., C. I. BRAY, AND RALPH S. WOODWARD.

North Louisiana Hill Farm Experiment Station, Homer

DAWSON M. JOHNS, *Superintendent*

HOMER E. WRIGHT, *Assistant Horticulturist*

VERLIN P. BENNETT, *Research Associate in Agronomy*

THOMAS HANSBROUGH, *Research Associate in Forestry*

This station was provided for by Special Act No. 127 of the 1946 regular session of the State Legislature. Land purchases were made in 1947 and 1948 from these funds and a \$10,000 contribution by the Claiborne Parish Police Jury. The station now occupies 1123 acres in one block, including roads, building sites, and other utility areas. The property fronts on State Highway 12 and U. S. Highway 79.

The work of planning and developing the station was begun in November, 1947. Much of the financial resources and efforts of the staff members of the station have been directed toward the development and improvement of physical facilities.

About 75 per cent of the land had been cultivated at one time or another since the original settlers began opening up the area for farming purposes in the early 1800's. However, most of the land which



Office building at the North Louisiana Hill Farm Experiment Station at Homer.

had been cultivated was abandoned for farming purposes because of continued soil depleting practices and, no doubt, changes in social and economic conditions.

The building of roads, filling of gullies, removal of stumps and trees from areas to be cleaned up for cultivation, the opening of pastures and planting of trees have been major operations. It would scarce-



Superintendent Dawson M. Johns conferring with a farmer of the area served by the North Louisiana Hill Farm Experiment Station, Homer.

ly overemphasize the poor condition of the land at the time operations were begun to say that not a single acre was in suitable condition for tractor farming. All of the field work is now being done with tractor equipment, although considerable work is yet needed to effect necessary land improvement for its use.

Animal Industry

Beef Cattle Pastures

Approximately 20 acres of Kobe lespedeza were planted at the rate of 25 pounds of seed per acre following the application of 400 pounds of a 3-12-12 fertilizer. The lespedeza attained six to eight inches in height before being utilized by grazing with two heifers and seven steers. The nine animals made an average gain of 96 pounds, or a total of 865 pounds, from July 16 to October 1.

An experimental winter and summer pasture study was begun in October, 1949, to determine the possibilities of developing a continuous grazing program. The following crop mixtures are to be grown in replicated plantings and utilized by grazing to determine the carrying capacity of these crop mixtures: 1, fescue grass and white clover; 2, fescue grass and Kobe lespedeza; 3, Bermuda and Dallis grass, and Kobe lespedeza; 4, lespedeza sericea and crimson clover.

—DAWSON M. JOHNS AND VERLIN P. BENNETT.

Swine Grazing

Feeder pigs were grazed on 3.75 acres of corn from July 17 to October 12. The pork gains were 347 pounds per acre from an average yield of 44 bushels of corn. An average of 12.7 bushels of corn and 54 pounds of supplement feed were required to produce 100 pounds of pork in this experiment. The weight of the pigs increased from an average of 113 pounds at the beginning of the test to a weight of 174 pounds at the end, or a gain of 61 pounds each.

Experience gained in conducting this experiment emphasized the importance of considering the availability of water, proper shade, adequate fencing, careful selection of feeder pigs and the costs involved in buying, transportation, and marketing. All these factors are especially important in buying feeder pigs for grazing purposes.

—DAWSON M. JOHNS.

Agronomy

Cotton Variety Test

Empire, Stoneville 2B, Louisiana 33, Miller, and Deltapine 15 have ranked as listed in the yield of lint produced per acre for a period of two years. The average yield of these varieties for 1949 was 768 pounds of lint per acre, and either one may be found satisfactory for this area if good farming practices are followed.

—FERD W. SELF AND DAWSON M. JOHNS.

Cotton Potassium-Sodium Replacement Study

An experiment with the objective of determining the value of sodium as a substitute for potassium in the nutrition of cotton has been conducted for two years. The yield of cotton was increased significantly with the use of potassium and sodium when applied separately and in combination with nitrogen and phosphate. However, the addition of sodium was not effective in increasing yields on the plots well fertilized with potassium. —JAMES G. MARSHALL AND DAWSON M. JOHNS.

Cotton Rate of 8-8-8 Fertilizer Test

An application of 600 pounds of an 8-8-8 fertilizer per acre has produced a two-year average of 1015 pounds of seed cotton per acre as compared with 606 pounds on the unfertilized area and 1017 pounds on the area to which 1200 pounds per acre of the same fertilizer had been applied. —DAWSON M. JOHNS.

Cotton Variety-Thrips Study

The results of one year's work on six varieties indicate that tobacco thrips have little effect on final yield. Infestations in early planted cotton may cause depressed growth during the seedling stage and a marked delay in date of maturity.

Tobacco thrips were effectively controlled with weekly applications of eight pounds per acre of a dust mixture of 3 per cent BHC, 5 per cent DDT, and 40 per cent sulphur. Measurements of plants in the seedling stage of growth indicated variety resistance to thrips injury in the following order: Empire, Stoneville 2B, Coker 100 W-R,

Delfos 9169, Louisiana 33, and Deltapine 15. The study should be continued with emphasis on evaluating the importance of the following effects which may be obtained through thrips control: 1, more vigorous growth during the seedling stage; 2, ten days to two weeks earlier maturity; 3, difference in variety susceptibility.

—L. D. NEWSOM AND DAWSON M. JOHNS.

Corn Variety Test

A test has been conducted for the past two years to determine the best adapted corn hybrids and varieties for this area. The adapted hybrids were significantly higher yielding than the open-pollinated varieties. The five leading hybrids outyielded the five leading open-pollinated varieties by approximately 57 per cent. Jarvis prolific was the highest yielding of the open-pollinated varieties. Dixie 11 outyielded Jarvis by 11.4 bushels per acre.

Variety or Hybrid	Ave. Yield 1948-1949 (Bushels)	Erect Plants (Per Cent)	Husk Grade	Per Cent Sound Ears
Dixie 11	38.4	86	Good	49.3
Dixie 17	38.3	94	Poor	44.1
N. C. 27	34.8	100	Poor	55.0
La. 468	34.2	92	Fair	62.0
Funk's G-720	32.2	92	Fair	55.4
Jarvis	27.0	86	Fair	53.7
Cocke's Prolific	24.9	98	Good	63.2
Hill's Y. Dent	21.8	94	Good	63.5
Calhoun	20.2	90	Good	72.3
Tuxpan	19.3	94	Good	68.3

Each entry was also graded for lodging, husk tightness and extension, and per cent sound ears. In choosing a hybrid it is well to consider these factors as well as yield.

A plant is considered lodged if the stalk is leaning more than thirty degrees or if the stalk is broken below the node where the ear is attached.

To be considered sound an ear must be free of weather damage, weevil damage, and rot.

Tests have also been conducted to test and study new breeding material to be used in developing better hybrids.

—HUGO STONEBERG, H. W. IVY, AND DAWSON M. JOHNS.

Corn Interplanted with Soybeans

Corn planted alone produced 37.3 bushels per acre, compared with 26.4 bushels where corn was interplanted with soybeans. The test will be repeated, using an earlier planting date.—DAWSON M. JOHNS.

Sorghum Variety Test

Five varieties of sweet sorghum were planted on May 23, to determine which varieties might be expected to give the most satisfactory yield for ensilage. Fertilizer was applied at the rate of 400 pounds of 8-8-8 per acre, supplemented with 30 pounds of nitrogen as a side-dressing. Honey Drip, Atlas, Red Top, Orange, and Black Amber

ranked in yield in the order listed. Although Honey Drip produced the highest yield, Atlas has the desirable qualities of being more resistant to leaf spot and lodging.—DAWSON M. JOHNS.

Sorghum Fertilizer Test

A group of plots receiving 200 pounds of a 5-10-10 fertilizer per acre before planting and a side-dressing of 24 pounds of nitrogen produced 24 tons of green growth per acre compared with slightly over 10 tons per acre on similar plots that were not fertilized. See photograph for growth comparison.

—DAWSON M. JOHNS.



Sorghum Fertilizer Studies. Left, unfertilized; right, fertilized.

Sudan Variety Fertilization Study

Common, Sweet, and Tift varieties of Sudan grass were planted April 11, following an application of 600 pounds of an 8-8-8 fertilizer per acre. The plots were divided for a study of the influence of additional nitrogen applied as a side-dressing on the forage yield. The side-dressing applications of nitrogen were made at the rates of 32 and 64 pounds per acre on May 3. Forage yield data were taken by clipping the plots June 1, June 15, June 30, and July 14.

Common Sudan produced the highest tonnage of forage from all nitrogen levels, followed by Sweet and Tift. The proportionate increase in forage production due to the nitrogen used as a side-dressing was greater from the 32-pound per acre application than from 64 pounds.

Under field grazing conditions, dairy cattle showed a preference for Sweet over Common Sudan. Further studies to determine which variety will produce the highest production of milk on an acre basis when grazed should be conducted.

—DAWSON M. JOHNS, VERLIN P. BENNETT, AND C. R. OWEN.

Lespedeza Variety Test

A test of four varieties was planted April 11, following an application of 400 pounds of an 8-8-8 fertilizer per acre. Hay yields were recorded, and the varieties ranked in the following order: Kobe, Korean, Common, and sericea.—DAWSON M. JOHNS AND C. R. OWEN.

Winter Clovers and Grasses

Various varieties and strains of Subterranean, Crimson, White, Red, Hop, Persian, Ball, Lappa, Button, and Alsike Clovers, and fescue, rye and other grasses were grown for observation. Well organized experimental plantings have been established to determine more specifically the value of these crops for pasture and forage purposes in this area. Data will be collected during the current growing season.

—DAWSON M. JOHNS, VERLIN P. BENNETT, AND C. R. OWEN.

Bermuda Variety Test

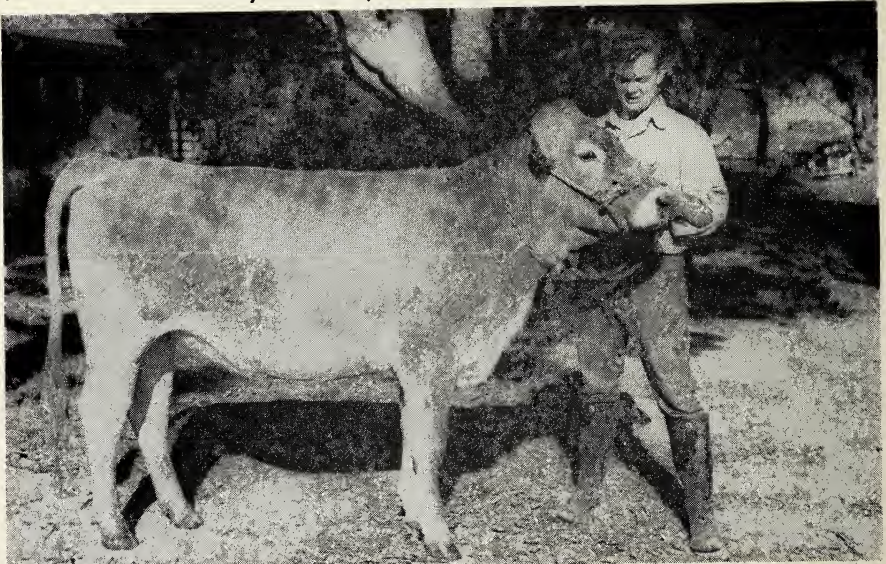
Coastal, Swanee, native and two strains of the Tifton variety of Bermuda grass were set out in a replicated planting June 10. An application of 400 pounds of an 8-8-8 fertilizer per acre was made June 30. Coastal and Swanee made good growth and established themselves better than the other varieties. All of the varieties will be fertilized again in the spring of 1950 and forage yield data will be taken during the growing season. —DAWSON M. JOHNS AND C. R. OWEN.

Dairying

Crossbreeding Studies with the Brown Swiss and Red Sindhi Breeds

The hot, humid climatic conditions of the South, particularly along the Gulf Coast, are believed to be responsible to some extent for the low average milk production per cow in this section. Since climatic conditions can neither be modified nor controlled, the problem must be attacked by developing methods for increasing the heat tolerance of Southern dairy cattle.

Crossbreeding experiments are being conducted in cooperation with the Bureau of Dairy Industry. Attempts are being made to combine



Two-year-old Brown Swiss heifer being used in crossbreeding experiments at the North Louisiana Hill Farm Experiment Station.

the heat resistant and other desirable characteristics of the Red Sindhi, a milking strain of the Brahman, with the milk producing qualities of the Brown Swiss.

The experiment was begun with a foundation herd consisting of 18 unbred Brown Swiss heifers selected from herds in the vicinity of LaCrosse, Wisconsin, and a Red Sindhi bull from India. As of December, 1949, the herd has been increased by the birth of six crossbred heifers and five crossbred bull calves. The average daily production of the Brown Swiss heifers as of November 30, 1949, was 18.5 pounds of milk testing 3.5 per cent fat.

All calves are weighed at birth and at the ages of 1, 2, 3, 4, 5, 6, 9, 12, 18, and 24 months for the purpose of making comparisons on growth rates. The udders of all heifer calves are measured at the ages of 3, 4, and 5 months in an effort to predict future producing ability. Several key body measurements are recorded at 6, 12, and 18 months of age and just after first calving to determine whether or not external anatomy is associated with milk producing ability. In the future, studies will be conducted to determine the relative ability of crossbreds and purebreds to withstand high temperatures.

Sufficient data have not been collected to draw any conclusions.

—J. B. FRYE, JR., GEORGE W. SCOTT, JR.,
DAWSON M. JOHNS, AND HEWITT D. CARTER.

Dairy Pastures

A study has been initiated to determine the comparative value of various winter and spring pasture crops for dairy cattle. Six 3-acre pastures have been planted in a replicated test of the following three pasture crops and crops mixtures: oats, oats and crimson clover, and oats and Singletary peas. Data on the response of these crops to grazing and the comparative returns from increase in milk flow will be recorded. —DAWSON M. JOHNS AND VERLIN P. BENNETT.

Forestry

The conditions of the forest areas here are typical of those throughout most of North Louisiana. The stands are low in growing stock and have been subjected to abusive cutting practices and frequent burning. Experimental work is being planned to improve the existing stands and to re-establish the bare areas by natural seeding and planting of seedlings from nursery stock. The objective of the work is to grow high quality timber from which greater returns may be obtained in a shorter period of time.

The engineering work has been done and the fire lanes have been laid out on 140 acres of woodland and old fields for experimental work. Projects are being set up this season to study the brown spot disease on longleaf, spacing of loblolly, and the influence of controlled burning on the rate of growth and development of mixed and pure stands of slash and loblolly pines. —THOMAS HANSBROUGH.

Horticulture

Fertilizer Studies With Peaches

A planting of 14 acres of Dixigem peaches was made to study the relationship of the growth and fruiting capacity to different levels of nitrogen, phosphorus, and potassium fertilization. Weather conditions were favorable for tree growth during 1949, and growth response to the different treatments was noticeable throughout the growing season.

Sweet Potatoes

Fertilizer studies to determine the most economical grade and rate of application have been conducted for two years. A continuation of these studies is necessary before definite recommendations can be made.

A planting of small whole Pelican Processor sweet potatoes produced 442 bushels per acre, compared with 245 bushels obtained from planting slips by the conventional method. An acre planting of whole Pelican Processors produced 7,424 pounds of dehydrated feed.

Sweet Corn Variety Studies

Fourteen commercial varieties of sweet corn were planted for yield and quality studies. Dixie Gold produced the greatest tonnage, 8,064 pounds per acre, and the largest ear, averaging 0.8 pound. Silver Cross Bantam, an earlier maturing variety with smaller ears, produced 947 dozen ears per acre.

Pole Lima Bean Variety Trials

Two new pole lima bean varieties, L-39-11-F and L-1-1, were grown in replicated plots with Willow Leaf, Florida Speckled, and Carolina Sieva. Florida Speckled produced green beans at the rate of 9,384 pounds per acre, followed closely by Carolina Sieva. L-39-11-F produced 7,300 pounds per acre of superior quality beans.

Watermelon Variety Studies

Fifteen varieties entered in the southern cooperative watermelon trials were grown in replicated plots. Black Diamond, Dixie Queen, and Missouri Queen averaged 15 tons of melons per acre, compared with an average of 11 tons for the remaining varieties. Wilt did not appear in the test, and the plots were not inoculated to study resistance to this disease.—ROBERT E. WRIGHT.

Poultry

A 30'x60' modern-type laying house has been constructed. Brooder house facilities for 700 baby chicks and ample storage space for feed have been provided in connection with the laying house. Feed troughs, roosts, dropping pits, and community nests have been built. Water and natural gas have been piped to the building.

Facilities will be in readiness for the growing out of 500 hens in the 1950 growing season. The group will be divided into two 250-

hen flocks for the purpose of determining the cost of maintaining a hatching egg flock as compared with a market egg flock.

The hatching egg supply flocks of Louisiana fall far short of meeting the needs of local hatcheries for hatching eggs. One reason advanced to explain this situation is that flock owners feel that they can make as much or more by selling market eggs. Data are not available to substantiate or to refute this claim. Records will be kept on the two flocks to show the comparative cost of producing hatching eggs with that of market eggs. —C. W. UPP AND DAWSON M. JOHNS.

Northeast Louisiana Experiment Station, St. Joseph

C. B. HADDON, *Superintendent*

JOHN C. CARPENTER, JR., *Assistant Animal Husbandman*

JOHN A. HENDRIX, *Assistant Agronomist*

SHERMAN A. PHILLIPS, *Assistant Agronomist*

RUSSELL Y. RATCLIFF, *Research Associate in Agronomy*

Agronomy

Corn Production

Progress in growing corn in Northeast Louisiana is well illustrated in the yield obtained in the years 1947 to 1949, inclusive, as compared to the years 1937 to 1939, inclusive. The seasonal conditions for the two periods were very similar, two years in each period having very dry summers, and one year in each period having above normal rainfall. The average yield for all varieties grown in variety tests for the period 1937 to 1939 was 47 bushels per acre; the average for the period 1947-1949 was 97 bushels per acre. In the earlier period 32 per cent of the varieties were hybrids. In the later period 87 per cent were hybrids. The largest number of hybrids in the later period accounts for approximately 24 per cent of the increase in yield. The remainder of the increase is due to the use of higher rates of fertilization (nitrogen). Cultural practices were the same for each period. In the earlier period the rate of fertilization was 32 pounds of nitrogen per acre, while in the later period the rate was 96 pounds per acre. —C. B. HADDON.

June Corn

It is some times necessary for the farmer to plant corn in June. It is possible to produce a fair yield of corn planted as late as June 15, if a good type of soil is selected, good cultural practices followed, and the right varieties planted. In planting corn as late as the above date it is more important that a good producing hybrid be used than is the case with earlier planting. In tests conducted at this Station, planting corn June 15, eight hybrid strains have given an average yield of 47.3 bushels per acre as compared to an average yield of 29.7 bushels for open-pollinated varieties. Expressed in percentage, the hybrids gave an increase of 59.25 per cent over the open-pollinated varieties.

These tests were fertilized with 64 pounds of available nitrogen per acre, all applied prior to planting. —C. B. HADDON.

Corn Fertilizer

The application of fertilizer to corn is profitable even on soils capable of producing more than 60 bushels per acre without fertilization. Tests at this station for the past three years substantiate this. In these experiments the average production of the check plots has been 61.8 bushels per acre. Adding 40 pounds of nitrogen per acre increased the yield to 80.5 bushels, or 18.7 bushels per acre over check. When the nitrogen was increased to 100 pounds per acre, the yield averaged 91.3 bushels per acre, or 29.5 bushels over the check plot. The addition of 48 pounds of available phosphorus to the 100 pounds of nitrogen gave an increase, due to phosphorus, of 5.4 bushels per acre. This increase is not significant, but indicates that the natural reserve of phosphorus is gradually being lowered. The addition of 48 pounds of available potash gave no increase in yield.—C. B. HADDON.

Soybeans

The commercial production of soybeans in the Louisiana delta began in 1940 and increased steadily until the present. Several factors stimulated growing of soybeans; namely, local markets, high prices for oil, shortage of labor which brought about mechanized farming, and land that produced a fair yield of soybeans but was unsuited for other crops. In 1935 the Northeast Louisiana Experiment Station started a soybean variety test to determine the best varieties adapted to this section for seed production and hay yield. Soybean varieties and their strains are very sensitive to photoperiod. It is necessary to classify types into maturity groups. For convenience these maturity groups are early, medium early, medium late, and late maturing varieties. The commercially grown varieties producing satisfactory yields in the early group include the S-100, Gibson, Patoka, and Wabash. The average yield of the early group over a period of years is 26.2 bushels per acre. Ogden, Burdette 19, Ral soy, Dortchsoy 2, and Dortchsoy 7 in the medium early group have an average yield of 34.3 bushels per acre. Volstate and Roanoke in the medium late group have an average yield of 30.8 bushels per acre. Mamotan 6680, Nela, Clemson, Acadian, and Pelican in the late maturing group have an average of 18.3 bushels per acre.—JOHN A. HENDRIX.

Corn Harvesting Test

Tests are being conducted with corn harvesting to determine the variety best adapted for mechanical pickers, the best time for harvesting, and the percentage of loss by using a mechanical picker as compared to hand harvesting. One year's work indicates very clearly that it will pay the farmer who intends to use a mechanical picker to select the variety very carefully so as to have a corn that stands up, has uniformity of ear height, does not have too much stalk or suckering, and has normal size ears. From this work it has also been found that the time of harvest is one of the controlling factors in keeping losses from use of mechanical harvesters down to a minimum. Corn losses

from use of mechanical picker can be minimized by allowing livestock to follow the corn picker, provided the cost of fencing is not too great. If livestock are to follow the corn picker, they should be turned in the field as soon after harvesting as possible.

Further work is necessary before recommendations can be made giving varieties of corn particularly adapted for mechanical harvesters, when it should be harvested, and how much loss a farmer can expect from use of a mechanical harvester as compared to hand harvesting.

—RUSSELL Y. RATCLIFF.

Long Staple versus Shorter Lint

Under the restrictive cotton acreage program, going into effect in 1950, many farmers are thinking of planting a long staple cotton in order that they may get a better price for their limited production. Records made at this station during the past five years indicate that even though the long staple cottons bring a better price the yields are so much lower than is obtained from the recommended shorter staple varieties that it is unprofitable to grow the longer staple varieties. Deltapine variety during the past five years has averaged 782 pounds of lint per acre. During the same years Wilds, probably the best long staple variety, has averaged 505 pounds of lint per acre. If the Deltapine lint sold for 28 cents per pound the Wilds would have to bring 43.3 cents per pound to be equal in value. If the Deltapine sold for 25 cents per pound it would be necessary for the Wilds to bring 38.7 cents per pound to get an equal return in money. Since the market does not usually pay premiums for long staple cotton equal to the requirements stated above, farmers will find it more profitable on their limited acreage to continue to grow the recommended shorter-staple varieties.—C. B. HADDON.

Animal Industry

Production Costs of Feeder Pigs

Preliminary tests (one year) on production costs showed that pigs could be raised slightly cheaper than they could be purchased on local markets. All production costs, except the labor for feeding, were included. No returns were figured for sale of sow. These two figures should easily off-set each other. Sows consumed a total of 3368 pounds and the pigs a total of 4876 pounds of feed. The total cost for 20 pigs raised to 100 pounds was \$335.26, or \$16.76 per pig. The same quality feeder pigs were selling on the local markets for \$22 to \$26 per 100 pounds. All feed costs were based on local prices at time used. These results are not conclusive, since they represent only one year's work.

—JOHN C. CARPENTER, JR.

Pasture Gains for 1949

Six pastures, plots of eight acres each, were used in this experiment. One steer per acre grazed from Feb. 24 to Oct. 28, 1949. Pastures 1, 2, 3, and 4 contained Persian clover and Dallis grass, white Dutch clover and Bermuda grass, Dallis grass and red clover, and

Alsike clover and Dallis grass, respectively. Pasture 5 was not planted and contained only native grasses, but was drained and kept clipped. Pasture 6 was seeded to fescue in the fall of 1948, one-half in white Dutch and one-half in Ladino clover. All pastures, except 5 and 6, were seeded in 1941. Red clover was re-seeded every three years in Pasture 3. The gains for Pastures 1, 2, 3, 4 and 5 were 302.5, 367.5, 412.5, 400.9, and 338.7 pounds per acre respectively. The gain on Pasture 6 was 289 pounds per acre. The reason for this low gain in No. 6 was that the steers were purchased too late in the spring to get the full benefit of the grazing. All steers were wormed and sprayed as needed. Salt was fed free choice in all pastures. The gains this year were somewhat lower than gains last year, owing partially to weather conditions. —JOHN C. CARPENTER, JR.

Winter Pasture Experiment

Twenty acres of oats and vetch were divided into two 10-acre plots. Ten grade Hereford stocker steers were put on each plot. Steers on plots had access to a wooded area. Those on Plot No. 1 received three pounds corn, cob, and shuck meal and one pound cottonseed pellets per head per day for 26 days. Steers on Plot 2 received no supplementary feed, except that both groups received hay when snow was on the ground for four days in January. The steers were placed on the plots December 14, 1948, and taken off February 24, 1949. Those in Plot 1 gained a total of 660 pounds, while the steers not fed lost 290 pounds. When turned on spring pasture the steers were divided, two from each group, in five different pastures. During the first three months of spring grazing the winter-fed steers gained 2465 pounds, while the steers that were not given additional feed during winter grazing gained 2880 pounds. All 20 steers brought the same price per 100 pounds at the time they were sold in May.

—JOHN C. CARPENTER, JR.

Hogging Off Corn and Soybeans

This completes the third consecutive year of hogging off corn and soybeans for the purpose of comparing gains with and without tankage. Results in 1949 agree with those of last year. The addition of tankage, fed free choice, did not increase gains sufficiently to pay for added cost of tankage. Good quality feeder pigs were turned on corn and beans July 26 and taken off September 13. Lot No. 1, with Funk's G-714 corn and Ogden beans and tankage, free choice, gained 1130 pounds. Lot No. 2 with Funk's G-714 and Ogden beans, no tankage, gained 1050 pounds. Lot No. 3, with Funk's G-714 and Nela beans (late), no tankage, gained 965 pounds. Corn yields in Plots 1, 2, and 3 were 65.3, 59.6 and 65.3 bushels, respectively. Pounds of corn required to produce a pound of pork were 3.23, 3.18, and 3.79 pounds for Plots 1, 2, and 3, respectively.

The feeder pigs used in this test in 1947 were not fed a balanced ration before they were turned on the corn and soybeans; there-

fore, the plot fed tankage free choice showed an increased gain due to tankage. During 1948 and 1949 the feeder pigs had a balanced ration, and no increase in gains due to feeding tankage resulted. According to the above results, the addition of the tankage to corn and soybeans being hogged off gave no increase in gains when pigs had been fed a balanced ration to 100 pounds.—JOHN C. CARPENTER, JR.

Plaquemines Parish Experiment Station

RALPH T. BROWN, *Superintendent*

The development of this station was started in the early spring of 1949. Drainage ditches were dug and land cleared for planting. Most of the farm machinery and equipment required in the operation of the station has been assembled. Two residences, a storage shed, and garage have been constructed.

Citrus

One year old Owari Satsuma and Washington Naval trees were planted at the station for fertilizer work to begin in the spring of 1950.

Seed of some twenty-two different rootstocks was obtained from Dr. F. E. Gardner of the U. S. Subtropical Station at Orlando, Florida, and from Dr. S. H. Cameron of the University of California at Los Angeles. Bud-wood of some 25 different varieties and species of citrus was collected by Dr. F. E. Gardner, and has been budded on trifoliata stock for trial and observation at this station.

Easter Lilies

Bulbs were obtained from Joseph Montelaro for use in a fertilizer test to be conducted in 1950 at this station. However, only enough were secured for three replications of the fertilizer and spacing test



Superintendent's home (foreground) and foreman's residence (background)
at the new Plaquemines Parish Experiment Station.

and the remainder were from a grower in the parish who purchased certified seed the year before. It is interesting to note that only .3 per cent of the plants secured by Mr. Montelaro are showing "fleck"; whereas, 9.5 per cent of those obtained from the grower in the parish have already been rogued out for this disease. This further emphasizes the importance of using bulbs for seed stock from an area known to be free of the disease.

Vegetable Crops

The work in vegetable crops this past season consisted of variety trials with various vegetable crops to determine the adaptability of the various varieties to this area. The results of these trials are presented in the following paragraphs.

Tomatoes — Seven commercial and home garden varieties of tomatoes were transplanted to the field on March 9, 1949, two feet apart on four-foot rows, to which 1000 pounds of 6-8-8 fertilizer had been applied on March 8, 1949. All plots were top-dressed with ammonium sulfate at the rate of 150 pounds per acre. The yields of marketable tomatoes were as follows: Gulf State, 26,971; Jefferson, 24,804; Allseason, 24,516; Rutgers, 24,499; and Grothen Globe, 17,724 pounds per acre. Jefferson and Rutgers were slightly later than the others, however, producing 8,185 and 8,820 pounds per acre the first two weeks of harvest. Gulf State, Allseason and Grothen Globe produced, on the other hand, 14,834, 12,993 and 13,462 pounds per acre, respectively, the first two weeks of harvest. The same varieties were used in the fall test, planted in August and top-dressed with 200 pounds of 8-8-8 fertilizer per acre. On September 30, 1949, a second top-dressing of this mixture was applied at the rate of 400 pounds per acre and a third on October 20, 1949, at the rate of 400 pounds per acre. A dust consisting of 1 part of Dithane (Parzate), 2 parts of cryolite and 7 parts of talc was applied weekly from September 1 to December 1 to control leaf diseases and the tomato fruit worm. The control of these pests was most effective until its use was discontinued. The yields of marketable tomatoes, in pounds per acre for the leading varieties, were as follows: Jefferson, 18,714; Louisiana Gulf State, 15,070; Marglobe, 14,486; Allseason, 13,800; and Grothen Globe, 13,226. Here again the Jefferson and Marglobe were slightly later, producing 4,491 and 3,766 pounds per acre the first two weeks of harvest, whereas, Louisiana Gulf State, Allseason, and Grothen Globe produced 5,224, 4,416 and 5,026 pounds per acre, respectively, the first two weeks of harvest. Jefferson ripened equally as well as any variety in the test when picked in the green-wrap stage.

Bush Beans — Thirty-one varieties and breeding lines were planted at the Station in cooperation with the U. S. Vegetable Breeding Laboratory, as part of the Southern Regional Snap Bean Trials.

Contender (B1625-17), released November, 1949, by the U. S. D. A., excelled all varieties in production in both spring and fall trials at

this station. In the spring it produced 235 bushels per acre as compared with 98 for the Stringless Black Valentine, the variety most widely used in commercial plantings in this area. Like Black Valentine, it germinates well. The pods are similar to those of Black Valentine. Other leading varieties were: Fulcrop, another early, high yielding variety, producing 216 bushels of beans per acre; and Logan, another dark green bean of high quality, which produced 194 bushels per acre in the spring planting but germinates poorly and therefore would be recommended with reluctance for this area. Introductions B1801-7 and B1643-1, which yielded 218 and 221 bushels per acre, respectively, were the most promising greed-podded lines.

Pole Beans — Canfreezer and Green Savage were grown in comparison with Blue Lake, Blue Lake Hybrid No. 65, McCaslan, and Black Creaseback. There was no significant difference in the yields of Canfreezer, Green Savage, and Black Creaseback, which yielded 607, 609 and 607 bushels of green beans per acre, respectively. All three were significantly more productive than Blue Lake, McCaslan, and Blue Lake Hybrid No. 65, which produced 477, 439 and 350 bushels of green beans per acre, respectively. Canfreezer was preferred by most of the vegetable growers who saw the bean trials, because of the long, round, green, high quality bean, and early heavy production. The production of Green Savage and Black Creaseback held up better than with the other varieties throughout the fruiting season, but the quality was not nearly so good as that of Canfreezer, Blue Lake and Blue Lake Hybrid No. 65.

Cabbage — Louisiana Allyear and Glory of Enkhuizen were the leading varieties in the fall trials. Allyear produced 8,640 pounds per acre, whereas Glory of Enkhuizen was second with a yield of 6,178 pounds per acre.

Cauliflower — Of the four varieties of Snowball planted at this station in the fall of 1949, Snowball M was the earliest and gave the greatest yield, followed closely by Snowball A, another early variety. Snowball Y produced a good yield of marketable curds, but was a week to ten days later than M and A. The strain X, the one most widely planted, was the poorest in production, but produced very small curds of excellent quality.

Bush Lima Beans — The ten varieties and breeding lines of bush lima beans included in the National Lima Bean Trials were planted at this station in the spring of 1949. Under the conditions of this test, which were most unfavorable, Early Thorogreen showed the greatest promise, producing 1,308 pounds per acre, as compared with 604 pounds per acre for Henderson's Bush, the variety most generally used in this area. Oklahoma 13-1 yielded 1,046 pounds per acre and shelled out 38.5 per cent, as compared with a shelling per cent of 25.3 for Early Thorogreen.

Sweet Corn — Sixteen of the leading commercial varieties of

sweet corn were grown at the station last spring as part of the Southern Regional Corn Trials in cooperation with the U. S. Horticultural Field Station in Meridian, Mississippi. The results of the five leading varieties are shown in comparison with Golden Cross Bantam in the table below.

Variety	Color	Length of Ears in Inches	Marketable Green Corn		Days Earlier or Later Than Golden Cross Bantam	General Appearance In Comparison With Golden Cross Bantam
			No. of Ears per Acre	Wt. in lbs/Acre		
Oto	Yellow	8	12,852	6,999	-3	Better
Ioana Dark Red	Yellow	6¾	10,404	5,927	+5	Better
Tristate	White	7¼	8,908	5,247	0	Same
Aristogold Bantam Evergreen	Yellow	7½	8,704	5,274	+2	Better
Gulfcoast	Yellow	8½	8,500	5,357	-3	Better
Golden Cross Bantam	Yellow	7	7,140	3,754	0	Same

Irish Potatoes — Of the five varieties used in the spring test, LaSoda excelled in appearance, sprouted slower in storage, was equal to Katahdin in keeping quality, and out-yielded all varieties in the test.

LaSoda yielded 12,603 pounds of number 1 potatoes per acre as compared with 9,935 pounds for Triumph, which made the second highest yield. The potatoes were planted one month later than the usual planting date for this area, and this may account to some extent for the poor performance of Katahdin and LaSalle, two late maturing varieties.

Field Pea Variety Test — In a test, consisting of five of the leading varieties of field peas, Blue Goose excelled in production, producing 210 bushels per acre, followed by Brown Sugar Crowder and Calhoun Crowder, which yielded 171 and 144 bushels per acre, respectively. Calhoun Crowder was slightly earlier than Brown Sugar Crowder and Blue Goose. Black Eye was the earliest, coming in about one week ahead of the other varieties, but owing to poor germination the yield was only 102 bushels per acre. Black Eye was the most susceptible to weevil injury, however.

Sweet Potato Variety Test — Of the six leading sweet potato varieties and breeding lines which were included in the test, Heartogold excelled in earliness, resistance to soft-rot, soil-rot and production of marketable potatoes. Marketable, in this case, applied to freedom from any defects other than weevil damage. It produced 298 bushels per acre as compared with 119 bushels per acre for L224, which was very similar to Heartogold except that it was white-skinned with orange

flesh, while Heartogold was white skinned with a very deep salmon flesh. Unit No. 1 Porto Rico produced 60 bushels of marketable potatoes per acre.

In the starch test there was little difference between L196 and White Star, the two leading varieties in the test. They yielded 403 and 328 bushels per acre, respectively. This was the total yield, since all grades are used in the manufacture of starch and for feed.

Red River Valley Agricultural Experiment Station, Curtis

J. Y. OAKES, *Superintendent*

E. C. BASHAW, *Assistant Agronomist*

W. A. NIPPER, *Assistant Animal Husbandman*

The Red River Valley Agricultural Experiment Station is located on U. S. Highway 71 in Bossier Parish, approximately eight miles south of Shreveport and Bossier City and one mile south of Curtis. The development of this station was started during the early part of the year in 1949. Since that time considerable progress has been made with experimental work and on the building program. The spring of 1950 will see the original building program as embarked upon virtually complete, with residences to accommodate personnel attached to the station, machinery sheds, seed storage facilities, barns and tenant cabins adequate for our present plan of operation.

Experiments were started during the spring of 1948 on a somewhat limited scale. In 1949 the program was increased considerably and in 1950 the program will be greatly expanded.

The official opening and annual field day was held at the sta-



Office building at the Red River Valley Agricultural Experiment Station. It has a combination laboratory and assembly room for farmer meetings.



A typical technician's residence at the Red River Valley Agricultural Experiment Station. It is of brick veneer and frame construction, with a minimum amount of maintenance required.

tion in August with a large attendance. The event was climaxed by a barbecue sponsored by Shreveport and Bossier City civic organizations.

Corn Fertilization

The fertilization of corn in the Red River Valley area does not rank first in importance since corn has not been grown too extensively in the past. Its importance does rank high, however, in view of reduced acres of the number one crop, cotton, at the present time. With this in mind and the possibility of increases in hybrid seed for sale, the need for better yields from maximum fertilizer use cannot be overlooked.

Experiments on the fertilization of corn were started in 1948 and repeated in 1949. A leading variety adapted to the area was used in the test to determine what level of fertilizer application was the most desirable. It is recognized that nitrogen fertilizer plays the most important part in yields in the Red River Valley. Since experiments have proved this single element to play the most important part, applications were made at varying levels and using different sources of materials to determine their response in yields per acre. In addition to applying nitrogen alone, phosphorus and potassium were applied at one rate of application to study their place in a mixed fertilizer.

The tests were fertilized with 64 to 128 pounds of nitrogen per acre, 40 pounds being applied before planting and the remainder as a side-dressing at layby time. The phosphorus and potassium, where used at the rate of 40 pounds per acre, were applied before planting.

Dixie 11 was used both years in this test. In 1948, a uniform

stand of 7934 stalks per acre, or one stalk every 18 inches on 42-inch rows, was obtained, but in 1949 the stand was increased to 12,500 stalks per acre, or one stalk every 12 inches on 42-inch rows. The yields for both years indicate that from 90 to 120 pounds of nitrogen is required to produce maximum yields. Little or no benefit was obtained from the use of phosphorus or potassium in a complete fertilizer.

In 1948 the best yield, 78 bushels per acre, was obtained from 80 pounds of nitrogen. The rainfall for the year was low, and maximum benefits were not obtained from fertilizer. The 1949 growing season was favorable for corn, and the best yield, 100.3 bushels per acre, was obtained from 128 pounds of nitrogen.—J. Y. OAKES AND E. C. BASHAW.

Hybrid Corn Work

Open-pollinated commercial varieties and hybrids along with hybrids developed by the Louisiana Agricultural Experiment Station were used to determine the best yielding variety or hybrid and to test the newer hybrids under field conditions.

Of the commercially grown varieties in the 1948 test, the highest yields were obtained from the following: Louisiana 7102—83 bushels; Dixie 11—79 bushels; N C 27—77 bushels; Dixie 17—69 bushels; and Funk's 714—67 bushels per acre.

In the 1949 test the highest yielding commercially grown varieties were: Dixie 11—108.5 bushels; Dixie 17—107.5 bushels; La. 468—105.6 bushels; La. 9016—103.1 bushels; La. 521—101.1 bushels; Funk's 790W—100.6 bushels; La. 7102—99.8 bushels; La. 8110—98.8 bushels; Dixie 18—97.4 bushels; Funk's G 714—96.4 bushels; and Funk's 737—94.7 bushels per acre.

The results for two consecutive years show that the above varieties and hybrids have been consistent in producing high yields, with Dixie 11 and La. 468 among the best for this area.

The yields for 1948 were somewhat lower than for 1949 owing to a rather dry season, whereas 1949 was a favorable year with a rainfall well distributed over the growing season.

Experimental Louisiana hybrids were placed under field tests to obtain additional data on those that produce high yields. Fertilizer was applied at the rate of 400 pounds of 8-8-8 per acre before planting, with an additional 64 pounds of nitrogen applied as a side-dressing at layby time. The corn was planted on 42-inch rows with one stalk every 18 inches, giving a total of approximately 7934 stalks per acre.

Several of these experimental hybrids produced high yields. In comparison with the commercial test none of them out-produced Dixie 11, Dixie 17 and La. 468.

In addition to the above commercial varieties and hybrids and new hybrids, 48 new Louisiana single crosses, 128 Mississippi single crosses, and three Missouri and one Ohio hybrid were under test during 1949. Some of these single crosses produced outstanding yields.

—E. C. BASHAW, HUGO STONEBERG, J. Y. OAKES, AND W. A. NIPPER.

Cotton Fertilization

A general fertilizer experiment was set up in 1948 and repeated in 1949 to determine the best yields from various fertilizer applications. In 1948 fifteen fertilizer mixtures were used; and in 1949 the same test was conducted with three additional sources of nitrogenous fertilizer added to determine the best time of application. Fertilizers were applied at the rate of 600 pounds per acre, with sources of nitrogenous material added at the rate of 40 pounds per acre. These materials consisted of sodium nitrate, ammonium nitrate, and anhydrous ammonia. Forty pounds of nitrogen from each material were applied before planting, and on additional plots 40 pounds applied as a side-dressing.

In 1948 seasonal conditions were favorable for cotton growth, and the best yields were obtained from the 8-8-4, 10-8-8, 8-0-8, and 12-8-8. In 1949 the year was unfavorable with a high amount of rainfall and unusually high insect infestations. This resulted in low yields even though every effort was exerted to control insects; as a result the yields could not be evaluated in relation to the fertilizers used.

—J. Y. OAKES AND E. C. BASHAW.

Cotton Variety Test

An analysis of eleven varieties grown in 1948 and 1949 showed Deltapine 15, Coker 100 Staple, Coker 100 WR, Louisiana 33 and CSS9 significantly yielded more lint per acre than any other varieties used in the test.

Among these 11 varieties, Deltapine 15 is the only one that is superior to others in lint per cent. Louisiana 33 produces an average of one thirty-second of an inch shorter cotton than any of the others. Empire produces the largest boll in this group. These two-year results indicate that Empire and Deltapine consistently produce a few more pounds of lint per acre than any of the other varieties included in the study.

The accompanying table gives a comparison of some of the varieties included in the test.

Acre Yield of Lint

Strain	1948 (Lbs.)	1949 (Lbs.)	Ave. Acre Yield of Lint (Lbs.)	Ave. Lint Per Cent	Ave. Staple Length (Inches)	Ave. Boll Size
Empire	836	698	767	35.0	1 1/16	66
Deltapine 15	724	717	721	39.5	1 1/16	81
Coker 100 Staple	732	637	685	34.6	1 1/16	79
Coker 100 W R	785	526	656	34.7	1 1/16	77
Louisiana 33	648	641	645	36.5	1 1/32	78
CSS9	675	571	623	35.9	1 1/16	73
Stonewilt	627	575	601	34.0	1 1/16	79
Stoneville 2B	696	473	585	34.6	1 1/16	75
Stoneville 5B	589	541	565	34.3	1 1/16	81
Delfos 9161	631	558	595	34.3	1 1/16	76
Bobshaw 1	549	507	528	33.2	1 1/16	77

A difference of 165 pounds of lint per acre is required for significance.

—E. C. BASHAW, F. W. SELF, AND J. Y. OAKES.

Small-Plot Tests of Several Insecticides for Cotton Insect Control

The following insecticides were compared in a randomized, replicated small-plot test: special calcium arsenate, special calcium arsenate plus 1 per cent gamma benzene hexachloride, special calcium arsenate plus 1/2 per cent parathion, chlordane - DDT mixture (2-1), and toxaphene - DDT (2-1). The calcium arsenates were applied as dusts at the rate of about 12 pounds per acre per application, and chlordane - DDT and toxaphene - DDT Mixtures as concentrated sprays at the rate of 2.25 pounds of technical material per acre per application. Seven applications were made between July 11 and August 25.

In general the special calcium arsenates gave more efficient control of the boll weevil and less efficient control of the bollworm than the spray concentrates. This was in line with the expected performance since calcium arsenate is more toxic to the boll weevil than chlordane and toxaphene; and DDT, which both spray materials contained, is more effective against the boll worm. Calcium arsenate without an aphicide allowed the build-up of a heavy aphid population. Calcium arsenate containing either benzene hexachloride or parathion and both spray materials gave good aphid suppression. The effect of the spray concentrates in preventing build-up of aphids was surprising, since neither DDT, chlordane, nor toxaphene is considered particularly effective against the cotton aphid.

All materials gave sufficient control of one or more pests to allow increases of approximately one-half to three-quarters of a bale of seed cotton per acre when compared with an untreated check included in the test.—JOHN S. ROUSSEL, L. D. NEWSOM, C. E. SMITH, AND E. C. BASHAW.

The Effect of Aphid Infestation on Vegetative Growth and Fruiting Behavior of the Cotton Plant

The effect of five different levels of aphid infestation upon various characteristics of the cotton plant was studied in randomized, replicated small-plot tests. Compared to light infestations, heavy aphid infestations produced small decreases in weight of air-dried, defoliated plants, in per cent of blossoms maturing bolls, in yield in pounds of seed cotton per acre, and in size of seed as measured by seed index, in addition to increasing the number of bolls shed per plant. Except for the number of bolls shed per plant, these differences were not statistically significant.

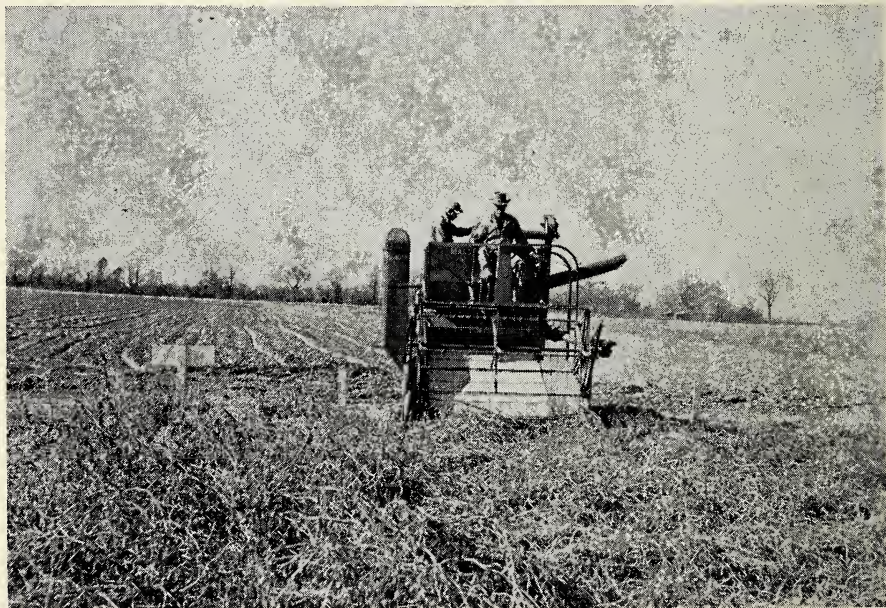
Difficulty was experienced in establishing and maintaining infestations at the desired level. Heavy rains frequently destroyed most of the aphids. Under such adverse conditions it was impossible to establish infestations at levels high enough to cause the heavy injury which aphids often cause to cotton. The moderate amount of defoliation which occurred seemed to benefit the plant to some extent by reducing the amount of boll rot in the heavily infested plots as compared to the check plots.

During the course of this study all the blossoms produced on 250 plants were tagged with dated tags at daily intervals during the fruiting period. Records were kept of each blossom to determine if it was shed or matured a boll. Over 50 per cent of the entire crop produced by these plants developed from blossoms occurring after August 1. Nearly 10 per cent of the total crop developed from blossoms occurring during the week of August 25 - September 3. These data emphasize the importance of insecticide application late in the growing season when boll weevil populations are heaviest. —T. R. PFRIMMER,

L. D. NEWSOM, C. E. SMITH, J. S. ROUSSEL, AND E. C. BASHAW.

Soybeans

Fifteen soybean varieties were included in the commercial variety test in 1949. The test included early, medium late, and late maturing varieties mostly of commercially grown soybeans. This work was started with varieties that had been grown in the Red River Valley



Typical scene at the Red River Valley Agricultural Experiment Station. The combine is harvesting soybeans on increase blocks of the newer varieties.

area with little information available as to their productive capacity or adaptation as compared to other varieties and strains.

Early beans include the S-100 and Ogden with the former being slightly earlier than the Ogden. The S-100 matures early and under favorable conditions shatters badly and, therefore, requires harvesting as soon as possible after maturity. On the other extreme this bean will not withstand prolonged wet periods without severe reduction in the quality of seed produced. The varieties Palmetto, Clemson non-

shattering, Nanksoy, and Red Tanner are medium late to late maturing. Late maturing varieties include the Louisiana Green, Ootootan, Seminole, Pelican, Acadian and Mamloxi. The early producing varieties produced the highest yields.

The U. S. Regional soybean variety test included 44 strains of commercial and unnamed soybeans placed under observation for the purpose of testing yields and performance under conditions in the Red River Valley area. This test consisted of four groups, early maturing, medium early maturing, medium late maturing, and late maturing soybeans. These varieties and strains are tested with the expectation of finding a bean that produces high yields and is suitable to the area.

When soybean varieties are developed or introduced that offer some promise in yield and general performance the first step is to try them out under field conditions to check their ability to produce and withstand field conditions. The S-100 soybean, developed in Missouri, and Louisiana Green and 41-1219, both unreleased soybeans, were placed on increase for the purpose of increasing seed to be made available for further use by individuals interested in producing seed for sale. By this means the seed became available to farmers rather rapidly.

—E. C. BASHAW, JOHN P. GRAY, AND W. A. NIPPER.

Sudan Grass

Three varieties of Sudan grass were tested during the summer of 1949. Harvests were made July 7, August 16, and September 22. The total yield of each variety expressed in tons of air-dry forage per acre was: Tift 16.3, Sweet 15.9, and Common 12.5. This crop offers an excellent possibility as a temporary summer pasture if properly grazed, as it is available through the dry months when other pasture crops are at a stage of low productivity. Sudan as a hay crop should not be overlooked, as it offers an excellent hay for use during the critical winter months. —E. C. BASHAW.

Alfalfa Varieties

Alfalfa is particularly well adapted to the Red River Valley as a hay and pasture crop, and strong emphasis should be placed on selection of the best varieties for the area, proper seedbed preparation, adequate fertilization, and drainage.

Eleven popular varieties of alfalfa were selected and seeded in a replicated test in the fall of 1948. Prior to planting 600 pounds of 3-12-12 fertilizer were applied uniformly and steps were taken to assure adequate drainage.

Five cuttings were made at approximately one-month intervals from May through September. Total yields of forage, based on air-dry weight, for the five cuttings ranged from 7.3 to 10.4 tons per acre. Varieties producing the highest to lowest yields were as follows: Southwestern Common, 10.41; Harry Peruvian, 10.35; Peerless, 9.99; Okla-

homa Common, 9.90; Buffalo, 9.74; Arizona Chilean, 9.70; Atlantic 9.36; Kansas Common, 9.21; Ranger, 9.10; French Du Puit, 8.46, and African, 7.30 tons per acre. —E. C. BASHAW AND J. Y. OAKES.

Dallis Grass

Approximately four acres of improved Dallis grass were planted in the spring of 1948 as a seed increase block, but owing to late planting and adverse weather conditions only a small amount of seed was harvested. These seed were planted in the spring of 1949 for further increase, but because of excess rainfall during the growing season no seed were produced from new plantings. The older plantings produced a good seed crop and will be planted in the spring of 1950. This work will be continued with the better strains as selected in order that farmers may benefit from this program.

—E. C. BASHAW, W. A. NIPPER, AND J. Y. OAKES.

Oat Variety Test 1948 - 49

An oat variety test consisting of 12 varieties from various southern states was conducted during the 1948-1949 growing season. Every precaution was taken to give each variety an equal chance in the experiment by randomizing the plots and replicating each variety three times. The test was planted October 26, 1948. The varieties, with yields in bushels per acre, were Alber, 112; Victorgain, 105; Fulgrain, 101; Florida 167, 89; Camellia, 76; Nortex 107, 74; Applr, 74; Baylis, 73; Red Rustproof, 66; Traveler, 66; Lega, 65 and La. 42-48, 65.

Observations were made throughout the growing season to determine the forage value of each variety. All plots were seeded at the rate of three bushels per acre, and a good stand was obtained from each variety. The Alber, Fulgrain, Lega, Florida 167, and La. 42-48 would have provided the earliest grazing. These varieties appeared to be the best forage types of the varieties tested. By late December the above varieties were seven to ten inches tall with rank vigorous growth, whereas the other varieties in the test, Nortex, Applr, Baylis, Red Rustproof, and Traveler, were about four inches tall. Camellia and Victorgain ranked second in the test and were six to eight inches tall in late December.

The varieties Alber, Fulgrain, Florida 167, and La. 42-48 continued to look very good during January and February and were better than 12 inches high by the middle to last of February.

The severe cold in early February affected all varieties to some extent, with the Florida 167, La. 42-48, and Alber affected most, but all recovered very rapidly, suffering only a slight setback.

—E. C. BASHAW AND J. Y. OAKES.

Winter Cover Crop Test, 1948 - 49

A winter cover crop test consisting of eleven varieties of winter legumes was conducted during the 1948-49 season. Varieties from

Washington State and varieties purchased from local seed stores were included in this test. The plots consisted of four 42-inch rows, with each variety replicated three times in the test. The test was planted November 2, 1948.

Yields in the order of production in tons of green matter per acre were as follows: Dixie Wonder, 5.38; Austrian winter peas, 4.15; common vetch, 3.30; Singletary peas, 2.58; Bangolia pea, 2.31; Melilotus Indica, 2.04; and Flat Pod peas, 1.90.

Observations were made of the growth during the winter, with notes taken on each variety. The Bangolia made a very rapid growth and was suitable for turning under by March 1. The plant resembles the Dixie Wonder in many respects, except for its early vigorous growth. The Washington State strain of Dixie Wonder ranked next to Bangolia in growth and cover, followed closely by the common strain of Dixie Wonder. The Austrian winter peas ranked next but were somewhat later than the Dixie Wonder strains and did not grow as rapidly.

—E. C. BASHAW AND J. Y. OAKES.

Rice Experiment Station, Crowley

RUFUS K. WALKER, *Superintendent*

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Expansion of the Rice Experiment Station

1909 — The Rice Experiment Station was established in 1909 on 60 acres of land furnished by the Acadia Parish Police Jury. The Experiment Station was established on a cooperative basis between the Louisiana State University and the United States Department of Agriculture.

1930 — As the need for more information was in demand, and the existing facilities were limited, an additional 51 acres of land was purchased by Louisiana State University in 1930 for experimental work.

1948 — Because of drastic changes in harvesting methods, rotation problems, need for production of pure seed, and many other problems, the need for additional facilities was recognized. The Louisiana legislature appropriated \$360,000 in 1948 for a two-year period to expand the facilities of the Rice Experiment Station. Two adjoining farms with a total of 719 acres were purchased and operations were begun in the spring of 1949. In addition to normal operations at the old station, some of the activities on the newly acquired property during 1949 were as follows: a pasture-rice rotation experiment involving 45 acres was planted and data obtained; approximately 75 acres were planted to rice for foundation seed and varietal study; 8 acres of Dallis grass were planted for seed increase; an extensive winter grass and

legume study was inaugurated; 60 acres of oats were planted for seed and for grazing; rice drying and storage facilities neared completion; two 40' x 60' steel buildings were built; approximately two miles of natural gas line was laid, and a natural gas engine installed at the bayou pump for irrigation; approximately two miles of new canal was dug by dragline, and concrete pipe for road crossings, drainage ditches, and floodgates was installed; a tenant house was renovated for the foreman's residence; another tenant house was renovated for temporary residence of a staff member; a farm residence was renovated for the superintendent's residence; 25 head of steers were bought for the grazing experiments; and the farm implements necessary for operating were obtained through a lease agreement with the International Harvester Company.

Fertility Studies

Straw and Fertilizer Applications to Land Planted to Rice Every Year and in Alternate Years on Crowley Silt Loam Soil

An experiment has been conducted for 12 years to determine the effect on the yield of rice from turning under 3 tons of rice straw per acre and planting rice with and without 400 pounds of 6-8-8 fertilizer per acre. The study has been made on plots planted to rice every year and on plots planted to rice in alternate years. In 1949, where rice had been planted in alternate years, the application of straw gave an increase of 9.5 bushels per acre over the check, while the application of straw and fertilizer produced an increase of 38.3 bushels per acre over the check. The 12-year average increase in yield over the check was 6.4 bushels per acre from straw alone and 18.0 bushels per acre from straw and fertilizer. In the plots that have been planted to rice 12 successive years, the application of rice straw resulted in an increase of 5.6 bushels per acre over the check in 1949, while the application of straw and fertilizer gave an increase of 16.6 bushels per acre over the check. The 12-year average increase in yield over the check was 3.4 bushels per acre due to straw and 14.4 bushels per acre due to straw and fertilizer. These experiments indicate that a relatively high and stable yield might be maintained by the addition of straw and fertilizer and planting rice in alternate years. There was a gradual decline in the yield of rice over the 12-year period in all treatments where rice was planted every year.—R. J. MIEARS AND R. K. WALKER.

Fertilizer Ratio Experiments

The use of fertilizers on rice in Louisiana has become a common practice during the last several years. Various ratios of plant food were used at rates of 200, 400, and 600 pounds per acre in the 1949 experiment to obtain more data as to the amounts and combinations of the major fertilizer elements necessary for highest yields of rice. The following fertilizers were applied at the time of seeding in the amounts

of 200, 400, and 600 pounds per acre: 0-9-6, 6-9-6, 6-3-6, 3-9-6, 6-6-6, 9-9-6, 6-9-3, 9-6-9, 6-9-0, and 6-9-9. All treatments gave a substantial increase in rice yields over the check plots. The highest yields were from the application of 600 pounds of 3-9-6 and 600 pounds of 6-3-6. The average yield from the 600-pound application exceeded the average yield obtained from the 200-pound applications in seven of the ten treatments. There was little difference in the yields from the application of 200 or 400 pounds of the various combinations of N, P₂O₅, and K₂O. —R. J. MEARS, R. K. WALKER, AND M. B. STURGIS.

Forage Studies

Pasture - Rice Rotation Experiments

The pasture-rice rotation experiments were continued in 1949 and continue to show the high value of improved pastures for increasing beef yields and increasing rice yields following improved pastures. There were five locations of these experiments in various stages of completion on the different soil types of the rice area. One experiment was completed at A. M. Moore's farm, Oberlin, Louisiana, and the second consecutive rice crop following three years of improved pasture produced 16.02 barrels per acre while the check pasture produced 10.83 barrels. The first-year rice crop following three years of



These oats were winter grazed, cattle taken off Feb. 27 and oats allowed to go to seed. (Photographed April 27, 1948.)



Top: This unimproved pasture in the rice area produced only 81 pounds of beef per acre in 1949 in pasture-rice rotation experiments. Below: Beef production from this improved pasture on the same farm was 432 pounds per acre in 1949.

improved pasture at Joe Zaunbrecher's farm, Gueydan, produced 22.60 barrels, while the check pasture produced 17.75 barrels per acre.

Beef yields on the third-year improved pasture at Karl Goebbel's farm, Elton, were 432 pounds per acre as compared to 81 pounds produced on the check pasture. This was the highest beef yield ever produced in any of these experiments. First-year improved pastures at E. O. Daughenbaugh's farm, Lake Charles, produced 230 pounds of beef per acre as compared to a loss of 6 pounds per acre for the check pasture.

An experiment was begun on the New Station in the spring of 1949. Data are being collected on the grazing.—DAVID E. BLACK.

Winter Grasses and Legumes

Forage studies were begun at the Rice Experiment Station in the fall of 1948 for the purpose of determining the adaptability of new species, varieties, and strains of grasses and legumes to the rice area. Fifty-one winter legumes and 16 winter grasses were planted October 23, 1948, in observation plots and data were collected throughout the year to include the following information: rate of growth, winter hardiness, forage production, heat resistance, rate of seed production, perennial tendency, and reseeding qualities. Several strains of fescue, orchard grass and a cross of Harding grass x Reed Canary showed up very well and will be included in further study. Of the legumes planted, the Louisiana white clover polycrosses were particularly outstanding and apparently are superior to Ladino clover in forage production, heat resistance, perennial tendency, and reseeding qualities. Several strains of crimson clover, red clover and subterranean clover produced excellent growth, and further tests on these have been started. Ten strains of alfalfa made very poor growth and seem to be unadapted to the rice area.

Sudan Grass

Three varieties of Sudan grass were planted in replicated plots to determine their adaptability to the rice area for supplemental grazing and hay and also to determine which variety was most suitable for this purpose. Yields were taken by clipping on August 7 and a second cutting on October 17. Tift Sudan was the highest yielding variety and showed a production of 12,609 pounds of green forage per acre as compared to 12,276 for Sweet Sudan and 10,089 pounds for Common Sudan.

Dallis Grass

Eight acres of new improved Dallis grass, strain B420, were planted June 15, 1949, for the purpose of increasing seed stocks. This will be made available to seed growers for further increase.

Oats

Twelve acres of certified Camellia oats were planted in the fall of 1948 to increase seed stocks for use on this Station, for the pasture-

rice rotation experiments, and for livestock feed. Approximately 70 acres were planted in the fall of 1949 for grazing and for seed production.

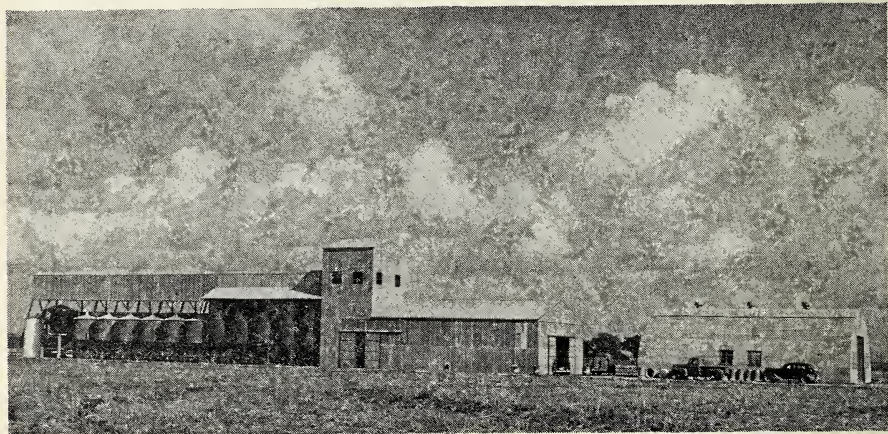
Alyce Clover

Twenty-eight hundred pounds of Alyce clover seed were harvested with the standard rice combine on six acres of clover that volunteered after a rice crop. This clover was cut and threshed in one operation and when the threshed clover was cured, a yield of one ton of good hay per acre was obtained. In view of the value of this clover seed and clover hay, this can be made a very profitable crop that would require very little time or expense. —DAVID E. BLACK.

Rice Drying and Bulk Storage

A farm size L. S. U. type rice dryer is being installed in conjunction with wood, steel, concrete stave and glass lined storage bins. Data are being kept to determine the maximum safe moisture level for long-time storage in each type bin, and insect control work is being done.

Rice of the 1948 crop was stored in the wood and steel bins from July until November, 1949. In November, 1949, rice of the 1949 crop was placed in the wood and steel bins at three different moisture



Rice drier and experimental storage bins at the new Rice Experiment Station.

levels, using two varieties. It was found that rice containing more than $14\frac{1}{2}$ per cent moisture heated in a short time.

Undried rice of 18 per cent moisture content was taken from the combine and placed in the glass lined bin. This bin was hermetically sealed and changes in atmospheric pressure were taken care of in a plastic breather bag in the bin. Temperature readings, taken constantly for the first few weeks of storage and periodically thereafter, showed that the rice did not heat appreciably when stored in this manner. This bin has not been opened for other tests of the rice.

The concrete stave bins were erected late in December, 1949, and will be filled with rice for study.—L. GEORGE COONROD.

Oat Varieties

In a field plot test of nine oat varieties seeded October 14, 1948, four varieties failed to produce enough grain to harvest, owing to freezing, leaf rust, and Helminthosporium. Alber gave the best yield, 28.7 bushels. Nortex yielded 19.3 bushels and Camellia 14.5. Ful-grain, which has previously appeared very promising especially when seeded late, showed Helminthosporium infection for the first time and yielded only 10.6 bushels. While Atlantic yielded only 9.1 bushels, it made a good growth and was very little affected by freezing. It appears to have possibilities for grazing. Thirteen of the 34 varieties grown in the uniform fall-sown oat nursery failed to produce grain.

—NELSON E. JODON.

Rice Breeding and Varieties

The object of the rice improvement work of the Rice Experiment Station is to develop and make available to growers better medium and long-grain varieties of early, midseason, medium-late, and late-maturity. Standardization of grain type, time of maturity, adaptation to mechanical harvesting, disease resistance, yielding ability, milling quality, and cooking quality also are considered.

In 1949 the work was carried forward in much the same way as in previous seasons, including the making of crosses, selection of pure lines and genetic studies in the breeding nursery, nursery row and field plot testing of promising selections in comparison with standard varieties on the station, outfield testing on farms, and the increase of pure seed. All the breeding and varietal experiments as well as small-scale seed increases were located on the original station, but larger increases of four released varieties and two selections for possible release were grown on the recently acquired lands.

The following varieties were grown by farmers on a trial basis: (1) Rexoro x Fortuna, Selection 322A6-23. This selection from the same cross from which Bluebonnet was selected, is of the same maturity as Fortuna. It has shorter straw and a shorter, clearer grain that should give a high mill yield of head rice of an attractive quality. (2) Rexoro x Purple Leaf, Selection 3-72-3. This selection is of the same maturity as Texas Patna, but has shorter straw. It appears to stand and yield better than Rexoro. The grain type is similar to, but larger than, the Rexoro x Fortuna selection mentioned above, and should also mill out a higher percentage of head rice than the main commercial long-grain varieties. (3) Blue Rose x (B. R. - Rex.), Selection 61-25-12. Two strains of this backcross selection, differing by a few days in maturity and both later than Blue Rose, were grown. Having disease resistance, smooth hulls, stiff straw, and maturing evenly, they appear to be satisfactory for combining and drying. The grain type is very similar to that of Blue Rose. (4) Blue Rose x (B. R. - Rex.), Selection 3I-9-2-4. This

backcross selection is a higher yielder than the above, but having weaker straw and a larger grain it is not so suitable for combining.

The present trend in market preference is toward the long slender grain types. The following selections of this type, in various stages of development, were notable in the 1949 tests: (1) Century. This Texas selection from Texas Patna x Rexoro - Supreme Blue Rose is about a week earlier than Bluebonnet, has a more slender grain type, and compares favorably with Zenith in yield tests. (2) A selection from Rexoro x Zenith that is fully as early as Zenith and similar in plant type. (3) Rexoro x (B. R. - Rex.), Selection 4II-1-8. This backcross selection matures with, but more evenly than, Bluebonnet. Better stands and yields have been obtained, and the grain is slightly more slender and less chalky than Bluebonnet. It appears to have considerable resistance to stem rot. (4) Rexoro x (B. R. - Rex.), Selection 4II-4-1-11. This selection matures with Texas Patna and has longer grain type than any variety being grown, but the yield is rather low. (5) Rexoro² x (B. R. - Rex.), Selection 7/8 Rex.-3-12. A selection from a second-step backcross that is resistant to *Cercospora* (long brown) leaf spot, and has shorter straw and very slightly shorter grain than Rexoro.

Of the six principal varieties in production in Louisiana in 1949, three were released from the Rice Experiment Station. These were Magnolia, Fortuna, and Rexoro and together they were planted on about 35 per cent of the acreage.—NELSON E. JODON.

Southeast Louisiana Dairy & Livestock Experiment Station, Franklinton

H. D. ELLZEY, JR., *Superintendent*
BILLY D. NELSON, *Assistant Dairyman*

Introduction

This station consists of 844 acres of cutover pine land, none of which had been in cultivation prior to the time it was acquired by the Experiment Station. The predominating soil series are: (1) Shubuta, (2) Bowie, (3) Providence and (4) Bude. These soils vary in topography from undulating to steep slopes. Surface drainage is generally good but internal drainage would be classified as slow and imperfect. The Bude series is especially poorly drained. These soils have a low productive capacity but do respond satisfactorily when limed and fertilized properly. Because of the topography and fertility level, the soils are best suited to pasture production and the growing of feed crops.

This Station's property is typical of the farming area it serves, i. e., the Florida Parishes. Owing to soil conditions and the fact that dairying is the main farming enterprise in the Florida Parishes, main effort of the Station has been directed to the production of pasture, hay and other feed crops and in the care and feeding of dairy herd replacements.

Corn Work

A program for testing the performance of the various hybrids and open-pollinated varieties was initiated in 1949. The four leading commercially available entries were Dixie 17 (84.5 bu.), La. 521 (81.5 bu.), Funk's G-790W (77.4 bu.), and Funk's G-714A (72.4 bu.). Dixie 17 produced an unusually large percentage of damaged corn and should be used for hogging off purposes only. The remaining three can be recommended for this area for any purpose.

Corn fertilization work was also begun in 1949. In this test the three elements nitrogen, phosphorus and potassium were varied in 4 per cent increments from 0 to 12 per cent. All treatments were applied at the rate of 600 pounds per acre and each was duplicated so that a 48- and a 72-pound nitrogen side-dressing could be made. It was readily observed from this test that a high level of nitrogen and phosphorus fertilization is necessary for maximum corn yields. Little response was evident from heavy applications of potash. Six hundred pounds of an 8-12-8 per acre side-dressed with 72 pounds of nitrogen gave the highest yield.

An experiment was also begun to determine the value of tung meal as a source of nitrogen for corn. Results obtained indicate that the nitrogen contained in tung meal is comparable to a like amount of nitrogen obtained from nitrate of soda. Maturity dates of corn were delayed about 4 - 5 days for each 500 pounds of tung meal. The fact that tung meal is produced in considerable quantity locally, and can be expected to increase corn yields as much as nitrate of soda, should stimulate its use in this vicinity. For best results the meal should be applied well in advance of seeding, and some phosphorus and potash should be applied at planting time in order to supply the plants' needs for these two elements.

Alyce Clover

Alyce clover is rapidly becoming a very dependable hay crop in the Florida Parishes. It produces a fine quality hay that is relished by all classes of livestock.

A fertilizer trial on limed and unlimed soil in which the phosphorus and potash were varied from 0 to 18 per cent, all at the 600 pound per acre rate, was initiated in June, 1949. Each treatment on the limed soil produced a higher yield than a like treatment on unlimed soil, these differences becoming greater as the analysis of the fertilizer increased. Six hundred pounds of a 3-12-12 per acre on limed soil produced the highest yield. The same treatment, plus 50 pounds per acre of Es-Min-El, a minor element mixture, was second in yield.

Clover Species Trial

A large number of clovers have been seeded in small plots for observation and forage yield studies. La. white clover 76, a clover

developed at the main station, appears to be the high producer among the permanent pasture types.

Several of the crimson clover varieties produced a considerably greater quantity of forage than common crimson clover. Notable among these were the varieties Thorsby and Thorton.

Pasture Studies with Dairy Animals

Winter Pastures

An experiment has been set up to evaluate several winter grazing crops (Table 1). The crop or crop combinations are: 1, oats alone; 2, oats and Singletary peas; 3, oats and crimson clover; and 4, Italian ryegrass and crimson clover. All pastures were limed with $2\frac{1}{2}$ tons of agricultural limestone in the fall of 1946. Immediately prior to planting all pastures received 500 pounds of a 6-8-8 fertilizer per acre. These pastures were also top-dressed with 40 pounds of nitrogen on January 23 and again on March 1.

The animals assigned to the "oats alone" treatment were removed March 1 and that pasture was seeded to Kobe lespedeza; the oats were combined when mature and the Kobe lespedeza was utilized for summer supplementary grazing purposes. The reason for removing the animals March 1 was to determine if the value of the harvested oat grain obtained as a result of allowing the oats to grow to maturity, would exceed the value of the grazing produced after that date.

Grazing commenced on all pastures December 14, 1948, and continued through May 18, 1949, a period of 158 days. The animals were placed on the various pastures after morning milking (7:00 A. M.) and allowed to remain thereon until evening milking (3:30 P. M.). From evening milking until morning milking, the animals were kept in a dry lot. A balanced dairy ration was fed on a 1 to 3 ratio, i. e., one pound of the ration for every three pounds of milk produced. Hay and/or silage was fed as conditions warranted.

Results obtained indicate that winter grazing is a profitable undertaking. The oats-Singletary peas and Oats-crimson clover combinations gave a net return per acre above feed and pasture costs of \$110.80 and \$110.33, respectively, for the period December 14 - May 18. Both of these treatments had a carrying capacity of 1.1 cows per acre, or 900 - 925 pounds live weight. It should be pointed out that neither the Singletary peas nor crimson clover appeared to contribute substantially to the amount of grazing made available.

The Italian ryegrass-crimson clover treatment gave a net return of \$101.48 per acre above feed and pasture costs. Carrying capacity was .9 animals per acre, or 777 pounds of live weight. The average daily milk production for the animals assigned to this treatment was slightly higher than the others, but this amount did not offset the fact that this treatment could not support as many animal units per acre.

Removing the animals from the "oats alone" treatment March 1, overseeding with Kobe lespedeza and combining the oats when mature

TABLE 1. Winter Grazing Trials, Dec. 14, 1948 — May 18, 1949

	Oats & Sing. Peas	Oats & Crimson Clover	Ryegrass & Crimson Clover	Oats Alone ¹	Improved Permanent Pasture ²
Total no. actual days on pasture	136	136	136	57	79
Carrying capacity—ave. no. cows per acre	1.10	1.16	.97	1.2	.7
ave. lbs. live weight per acre	908	922	777	1044	533
Total gain or loss per cow in live weight	-87	+68	-70	-28	-34
Ave. prod. per cow for 3 weeks prior to Dec. 14	22.2	22.8	22.7	22.1	22.6
Ave. prod. per cow for last 3 weeks of trial	21.6	21.9	21.4	21.0	19.9
Ave. prod. per cow for duration of trial	22.8	22.0	23.7	22.3	19.9
Total lbs. milk produced per cow	3261	3155	3405	1425	1598
Total lbs. milk produced per acre	3695	3572	3374	1698	1119
Total lbs. concentrate fed per cow	1125	1097	1125	456	556
Total cost of concentrate per cow	\$ 51.41	49.89	51.41	22.17	27.05
Total no. days silage fed	136	136	136	63	79
Total lbs. silage fed per cow	1700	1700	1700	352	1349
Total cost of silage per cow	\$ 12.75	12.75	12.75	2.63	10.12
Total no. days hay fed	37	37	37	34	3
Total lbs. hay fed per cow	405	405	405	368	35
Total cost of hay per cow	\$ 6.05	6.05	6.05	5.52	.53
Total cost of feed per cow	\$ 70.21	68.69	70.21	30.32	37.70
Ave. daily cost of all feed per cow	.51	.50	.51	.48	.50
Gross value of milk per cow	\$210.36	203.45	221.28	92.76	98.40
Value of milk per cow above feed cost	\$140.15	134.76	151.07	62.44	60.90
Value of milk per acre above feed cost	\$158.98	157.51	147.58	75.59	43.03
Value of harvested oats	\$ —	—	—	8.10	—
Cost of pasture	\$ 48.18	47.18	46.10	38.73	—
Value of milk per cow above feed & pasture costs	\$100.90	94.09	103.54	38.18	—
Value of milk per acre above feed & pasture costs	\$110.80	110.33	101.48	46.48	—
Value of milk & oats per acre above feed & pasture costs	—	—	—	\$ 54.58	—

Milk was valued at \$6.548 per cwt., the actual average blend price received by the Station for the period in question.

¹Animals removed March 1 and placed on limed, seeded, and fertilized permanent pasture; therefore the data in this column represent a 57-day grazing period. Kobe lespedeza overseeded March 1.

²Animals were on this pasture from March 1 to May 18; therefore the data contained in this column represent a 79-day grazing period. These animals were on the "Oats alone" treatment from Dec. 14 to Feb. 28.

does not appear to be a good practice for this section. Especially is this true when one considers the value of Kobe lespedeza for summer supplementary grazing as compared to Sudan grass (see discussion under "Summer Grazing"). The net value of this practice above feed and pasture costs was \$81.30 per acre.

These trials are being continued during the 1949-50 season with some modification. Hairy vetch has been substituted for Singletary peas. Kentucky 31 fescue on sod, Italian ryegrass on sod and a dry lot group are new treatments.

Permanent Pasture Studies

Three permanent pasture treatments are under study (Table 2). These are: 1. lime—2½ tons dolomitic limestone; fertilizer—600 pounds 3-12-12; seed—white clover, Dallis grass and common lespedeza; 2. lime—2½ tons dolomitic limestone; fertilizer—600 pounds 3-12-12; seed, none. 3. lime—none; fertilizer—none; seed—none.

These pastures were established in the fall of 1947 but grazing was delayed until the 1949 season owing to the fact that the station did not acquire a dairy herd until late in 1948.

TABLE 2. Permanent Pasture Grazing Trials, May 19, 1949 - Nov. 30, 1949

	Limed, Ferti- lized, Seeded	Limed, Ferti- lized	No Lime, Seed or Fertilizer
Total no. of actual days on pasture	196.0	196.0	196.0
Carrying capacity—ave. no. of cows per acre	1.1	.58	.58
ave. lbs. live weight per acre	858.0	422.76	436.1
Total gain or loss per cow in live weight	+128.5	+111.8	+ 39.5
Ave. prod. per cow for 3 weeks prior to May 19	20.7	20.6	20.8
Ave. prod. per cow per day for entire grazing period	15.4	12.5	10.8
Ave. prod. per cow for the last 3 weeks of grazing period	10.3	6.8	6.6
Total lbs. milk produced per cow	3005.7	2451.0	2118.9
Total lbs. milk produced per acre	3331.9	1474.2	1230.5
Total lbs. concentrates fed per cow	1262.0	1063.8	995.3
Total cost of concentrates per cow	\$ 50.41	43.46	40.01
Total no. of days fed silage	59.0	59.0	59.0
Total lbs. silage fed per cow	1325.0	1325.0	1325.0
Total cost of silage per cow	\$ 5.30	5.30	5.30
Total no. days hay fed	10.0	10.0	10.0
Total lbs. hay fed per cow	79.0	40.0	150.0
Total cost of hay per cow	\$ 1.18	.60	2.25
Total cost of feed per cow	\$ 58.05	49.36	47.56
Ave. daily cost of feed per cow	\$.296	.252	.243
Gross value of milk per cow	\$169.13	137.92	119.23
Value of milk per cow above feed cost	\$111.08	88.56	71.67
Value of milk per acre above feed cost	\$122.86	54.16	41.50

Milk was valued at \$5.627 per cwt., the actual average blend price received by the Station for the period in question.

It was fairly certain before the experiment began that the limed, fertilized and seeded treatment would be superior, but no facts or figures were available on just how superior this treatment would be and what returns a farmer might expect from his investment. This information must be known and made available to a farmer before

he can be expected to carry out a given program. Also, considerable numbers of farmers in the Florida Parishes provide scant acreage of permanent pasture. By comparing the returns from the "no lime, fertilizer or seed" treatment with the returns from the "limed, fertilized and seeded" treatment he can readily observe that it is to his advantage to take the steps necessary to provide permanent pasture.

Grazing commenced on all treatments May 19, 1949, the day after winter grazing was terminated, and continued through November 30, 1949, the day before winter grazing commenced for the 1949-50 season.

The animals were allowed to remain on the various pastures from morning milking (7:00 A.M.) until evening milking (3:30 P.M.). A balanced dairy ration was fed on a 1 to 3 ratio. Silage, at the rate of 20 pounds per animal, was fed commencing October 3. Hay was fed free choice during the last 10 days of the trials.

It may be observed from Table 2 that the average carrying capacity for treatment 1 was 1.1 animals or 858 pounds live weight per acre, compared to .58 animals or 422 pounds live weight for treatment 2, and .58 animals or 436 pounds live weight for treatment 3. The value of milk per acre above feed costs was \$122.86, \$54.16 and \$41.50, respectively, for treatments 1, 2 and 3.

It is fairly obvious that the dairyman must provide improved permanent pastures by fertilizing, liming and seeding. The next step from the experimental view point is to find out how much fertilizer is needed, what grade, how often it should be applied, what season of the year it should be applied, and how it should be applied.

We need to know how often a pasture should be renovated, to what extent it should be renovated, and what implements will best do this job. We also should know if the species presently being used are the best, and we need to know how to manage these species in order to perpetuate them in a highly productive state. Experiments are planned looking toward answering these questions.

3. Summer Supplementary Grazing Studies

During the summer of 1949 the following summer grazing crops were used and compared with a limed, seeded, and fertilized permanent pasture (Table 3): 1, Kobe lespedeza overseeded on oats the preceding March and continuously grazed; 2, Sudan continuously grazed; 3, Sudan rotationally grazed; and 4, limed, seeded and fertilized permanent pasture. The Kobe lespedeza in treatment 1 was seeded March 1, 1949, at the rate of 30 pounds per acre. The oats on which lespedeza was overseeded were fertilized with 500 pounds of a 6-8-8 per acre at planting time and top-dressed on January 23 and March 1 with 40 pounds of nitrogen. The oats were grazed from Dec. 14 to February 28. (See "Winter Grazing Studies.") The Sudan grass in treatments 2 and 3 was seeded June 16, 1949, at the rate of 30 pounds per acre. An application of 350 pounds of a 6-8-8 per acre was made before planting. Treatment 4 (limed, seeded, and fertilized permanent pas-

ture) was handled as indicated under "Permanent Pasture Studies." A balanced dairy ration was fed on a 1 to 3 ratio. No hay or silage was fed at any time.

Grazing commenced on all pastures July 21, 1949, and continued through September 7, 1949. Because of an unusually wet summer this 49-day period was the most critical as far as the permanent pastures were concerned.

All pastures except treatment 4 were stocked at the rate of 1.25 cows per acre, or about 900 pounds live weight. Treatment 4 could support 1.06 cows per acre. Returns per acre above feed costs were as follows: Kobe lespedeza, \$40.05; Sudan grass continuously grazed, \$56.30; Sudan grass rotationally grazed \$55.34; limed, seeded and fertilized permanent pasture, \$28.78. One may readily observe from Table 3 that the use of fast growing annual crops such as Sudan grass is necessary in order to maintain milk production at a high level during the summer period. One may also observe that the returns from rotationally grazing Sudan grass were slightly less than when this grass was continuously grazed. It is believed that rotational grazing would have been superior had the trial extended over a longer period of time.

It was noted during the 1948 and 1949 seasons that the most critical permanent pasture grazing period not provided for is from the first of October until the latter part of November. During this period summer grazing crops have served their usefulness, permanent pastures are largely unproductive, and winter grazing crops have not made sufficient growth to merit grazing. Actually, therefore, there are three seasons instead of two when supplementary grazing is needed, i. e., winter, summer, and the period from early October to late November. This station will investigate the possibility of utilizing some crop such as Alyce clover, soybeans or velvet beans for grazing during this period. In any case, the dairy farmer should have on hand and feed silage and rely on such crops as oats or oat combinations for his succulent feed during the winter months.

Calf Feeding Trials

A great problem facing the dairyman in Louisiana is raising good replacements for his herd. The artificial breeding program has done much to cause the farmer to produce his own herd replacements by providing good sires. Nonetheless, much information is needed regarding the raising of dairy calves once they have been dropped. This station anticipates investigating many of these problems.

The Cornell system of feeding milk to dairy calves under Louisiana conditions is quite satisfactory but many dairymen feel that this system requires too much milk in view of the fact that New Orleans is largely a fluid market. In an effort to reduce the amount of milk consumed by calves, a modification of the Cornell system is presently being studied at this station in cooperation with the L. S. U. Dairy Department.

TABLE 3. Summer Supplementary Grazing Trials, July 21, 1949 — Sept. 7, 1949

	Kobe Lesp. Cont. Grazed	Sudan Cont. Grazed	Sudan Rot. Grazed	Fert., Limed, Seeded
Total no. of actual days on pasture	49.0	49.0	49.0	49.0
Carrying capacity—Ave. no. of cows per acre	1.25	1.25	1.25	1.06
Total gain or loss per cow in live weight	908.75	978.75	875.0	800.66
Ave. prod. per cow for three weeks before grazing period commenced	+20.0	-6.0	+29.0	+42.5
Ave. prod. per cow for entire grazing period	19.54	20.0	19.80	19.20
Increase or decrease in prod. per cow per day for grazing period	17.31	22.97	22.48	15.1
Total lbs. milk produced per cow	+2.33	+2.97	+2.68	-4.1
Total lbs. milk produced per acre	848.3	1125.8	1101.6	737.6
Total lbs. concentrates fed per cow	1060.4	1407.2	1377.0	786.7
Total cost of feed per cow	305.2	355.6	347.9	294.0
Ave. daily cost of feed per cow	\$ 12.60	14.68	14.37	12.14
Gross value of milk per cow	\$.257	.299	.293	.248
Gross value of milk per cow above feed cost	\$ 45.00	59.72	58.44	39.13
Gross value of milk per acre above feed cost	\$ 32.40	45.04	44.27	26.98
Gross value of milk per acre above feed cost	\$ 40.05	56.30	55.34	28.78

Milk was valued at \$5.305 per cwt., the actual average blend price received by the Station for the period in question.

Two groups of Jersey calves, divided as nearly equally as possible according to sex and size at the time they are dropped, are being used in the study. The calves assigned to the Cornell system are fed milk through the tenth week and will consume 364 pounds, while the calves used on the modified Cornell system are fed milk through the eighth week and will consume 266 pounds, or 98 pounds less milk. Data are being collected on each calf for the total amount of milk and calf starter it consumes, along with the total growth and weekly weights. Notes are also being kept on the general condition of the calves as growth progresses. Results from this study will be reported at a later date.

West Louisiana Experiment Station, DeRidder

C. B. ROARK, *Superintendent*

HAROLD E. HARRIS, *Assistant Agronomist*

West Louisiana Experiment Station is located on Highway 171, eight miles north of DeRidder in Vernon Parish. The location is on rolling grassland that was once heavily timbered with longleaf yellow pine. The soils are generally medium texture, permeable, fine sandy loams.

Work was started at this station September 8, 1947. Since this land was unfenced, unimproved rough cutover land, the first year was devoted to clearing it of stumps, shrubs and trees and preparing it for the plow.

Cost of Clearing Land

About 200 of the 740 acres of land have been cleared, plowed and put into improved pasture experiments. The land was cleared with a bulldozer and the use of dynamite. Records of the cost of clearing land showed this expense to be \$20.92 an acre. This expense was broken down on an acre basis as follows: pushing stumps, filling stump holes and raking pine knots, \$3.19; dynamite for blasting, \$1.35; tractor cost of hauling knots, \$.24; and labor cost, \$16.14. Land cleared in this manner can be used for crops or pastures and there are few or no stumps or knots to interfere with the use of machinery.

Buildings

The following buildings have been constructed: superintendent's residence and garage, a laboratory building, two residences for technical workers, a machine shed and shop, a hay barn with shelter for livestock, and a poultry building. Plans for building three small residences for labor are now underway.

Utilities include electric power lines, natural gas and running water from a deep well.

Winter Pastures For Beef Cattle

Pastures were established consisting of (1) oats and Louisiana white clover that produced 150 pounds of beef an acre in 105 days; (2) rye

grass and Louisiana white clover that produced 102 pounds in 70 days; (3) oats and common vetch that produced 181 pounds in 42 days; and (4) oats and Singletary peas that produced 137 pounds in 42 days.

Pastures 1 and 2 were seeded to Dallis grass in the spring follow-



Some 600 visitors saw Louisiana white clover and fescue grass in pasture experiments at the West Louisiana Experiment Station, Jan. 17, 1950.

ing fall plantings of clover and oats, and clover and rye grass. In this preliminary test of limited grazing, the oats and common vetch pasture produced the highest yield of beef per acre, but the oats and clover pasture and the rye grass and clover pasture became permanent pastures with the seeding of Dallis grass in the spring.

The peas in the oats and Singletary pea pasture did not add very much to the grazing value. When planted with oats, Singletary peas make slow growth until spring. This winter pea makes better growth under other conditions. The oats and clover pasture followed with a seeding of Dallis grass in the spring is the most efficient of the four pastures.

Temporary Summer Pasture For Beef Cattle

During the summer of 1949, two temporary pastures were established on $4\frac{1}{2}$ -acre plots. In order to avoid excessive tramping, cattle on each plot had access to four acres of range land which they grazed very lightly.

Plot 1 was seeded to Sweet Sudan and Plot 2 to Pearl Millet. An average of 15 cattle were grazed on the Sweet Sudan from July 9 to August 4, furnishing 390 cow days grazing, after which 73 bales of hay were harvested. The Pearl Millet plot carried an average of 22

cattle during the same period, furnishing 572 cow days grazing, after which 250 bales of hay were harvested. There appeared to be no difference in the palatability of the two pastures. The cattle seemed to relish each pasture about the same.



Cows on Dallis grass and Louisiana white clover at the West Louisiana Experiment Station, Jan. 17, 1950.

The Pearl Millet was superior to Sweet Sudan for grazing during the one-year test conducted in 1949. Frequent showers made growing conditions ideal for these summer pastures.

Five Methods of Planting Dallis Grass

Dallis grass is one of our best pasture grasses, but farmers often have difficulty establishing a stand of it. In this experiment, five methods of planting were tested. (See accompanying table.)

The stand having the greatest number of plants per pound of seed planted was obtained by rolling the seed into the soil with a culti-packer on a thoroughly prepared seedbed. There were 9,432 plants to one pound of seed.

Seed sown in a good growth of oats and clover that was grazed immediately after Dallis grass seed were sown gave next to the highest number of plants per pound of seed. There were 6,525 plants to one pound of seed.

Where Dallis grass seed were sown in a good growth of rye grass and Louisiana white clover, 5,867 plants were counted per pound of seed. This pasture was grazed immediately after the Dallis grass seed were planted.

Dallis grass seed sown on unplowed range land resulted in only 1,742 plants per pound of seed. The lowest number of plants per

Methods of Planting Dallis Grass

Pasture Number	Methods of Planting	Date of Planting In 1949	Rate of Seed Planted Per Acre	Number of Plants Per Acre	No. of Plants From a Pound of Seed Planted
6	Planted on a thoroughly prepared seedbed. The seed were rolled into the soil with a cultipacker.	May 18	17½ lbs.	165,060	9,432
10	Planted in a good stand of La. White Clover and oats that had been established on a good seedbed in the fall of 1948. The oats and clover were grazed for 105 days immediately after sowing the Dallis grass seed.	March 24	8 lbs.	52,200	6,525
9	Planted in a thick stand of rye grass and La. White Clover that had been established on a good seedbed in the fall of 1948. The rye grass and clover were grazed for 70 days immediately after sowing the Dallis grass seed.	March 23	8 lbs.	46,940	5,867
15	Planted on unplowed range land that had been harrowed lightly with a pine knot rake. The seed were sown on the surface. The plot was not grazed.	May 19	17½ lbs.	30,500	1,742
5	Planted in a thick stand of La. White Clover that had been established on a good seedbed in the fall of 1948. Clover was not grazed but saved for seed production.	May 18	17½ lbs.	17,140	980

pound of seed sown, 980, was where Dallis grass was sown in a thick stand of Louisiana white clover that was not grazed but used for clover seed production.

New Pasture Plants

Adaptation tests were conducted on 68 plots of new strains of clovers, grasses and alfalfas. Seed were harvested from two new strains of Dallis grass released by the main Station at Baton Rouge.

Bermuda Grass

Four new strains of Bermuda grass released by the U. S. D. A. Experiment Station at Tifton, Georgia, were tested. Coastal Bermuda is the superior strain. It grows about twice as fast as Common Bermuda and it is more drought resistant and frost tolerant than Common Bermuda grass. This grass produces very few seed and is increased by planting the stems. Ten acres have been planted at the West Louisiana Experiment Station.

U. S. Department of Agriculture

Sweet Potato Weevil Investigations During 1949¹

Efforts to control the sweet potato weevil by applying insecticides to the foliage of the plants in the field were continued during 1949. Although the infestation was significantly reduced by nine applications of undiluted calcium arsenate, 20 per cent toxaphene, 10 per cent chlordane, and 1 per cent parathion dusts at 14-day intervals, by five applications of undiluted calcium arsenate at 28-day intervals, and by six applications of DDT emulsion at 21-day intervals, the decrease probably did not justify the number of applications made. One calcium arsenate treatment was applied at 10 pounds per acre per application, the other dust mixtures at 20 pounds per acre per application, and the DDT emulsion at 3 pounds of technical DDT per acre per application. There were no appreciable differences in effectiveness of the treatments. High hilling of the plants at the last cultivation also reduced the weevil infestation.

Four pounds of parathion per acre worked into the top 4 to 5 inches of the soil in seed beds did not reduce the number of adults emerging from the beds, but reduced the number of plants produced. Similar results were obtained with 20 pounds of toxaphene. Ten pounds of chlordane applied similarly did not reduce the number of emerging adults or the number of plants produced. DDT applied to the soil at 100 pounds per acre retarded sprouting, but reduced the infestation of the plants to 0.8 per cent as compared with 17.5 per cent in the untreated beds.

A 10 per cent DDT dust applied to seed sweet potatoes at harvest killed all weevils as they emerged from the potatoes while in storage and prevented the seed from becoming reinfested. At ordinary storage temperatures some weevils did not emerge from the seed potatoes, but at 80° F. all weevils emerged before bedding time. Seed potatoes treated with 76 parts per million of DDT in October 1948, bedded in April, and dug up in June 1949 still had 74 parts per million of DDT on them.

Fourteen tests against sweet potato weevil adults were conducted in storage rooms with aerosols containing 3 per cent of DDT and 5 per cent of pyrethrum extract, at dosages of 5 to 60 grams per thousand cubic feet with exposures ranging from ½ hour of 17¼ hours. From 20 to 40 grams per 1,000 cubic feet with exposure of 2 hours or more was required to kill all adults when confined in cages 6 feet above the floor.

A power-operated dusting machine (Fig. 1) has been devised for

¹ In cooperation with the Louisiana Agricultural Experiment Station.

the treatment of seed sweet potatoes. A canvas hood is constructed over the conveyor section of a sweet potato washing machine, which uses rollers instead of a belt. A small duster and an electric motor are mounted on the framework, and the conveyor and the duster are both operated by the motor. Seed potatoes passing through this machine are turned on the roller conveyor so that all sides of them are exposed to the dust as it is discharged into the hood. This machine can dust seed potatoes as fast as a crew can handle them.

Single applications of standard (0.1 per cent) and double strengths of amine and sodium salts of 2,4-D killed all sweet potato plants that had been transplanted to rows, and 89 per cent or more of the plants growing in seed beds and mother rows. From 92 to 99 per cent of the seed potatoes were destroyed. There was little difference between results from the standard and double strengths or from the amine and sodium salts. One application of double-strength amine salt of

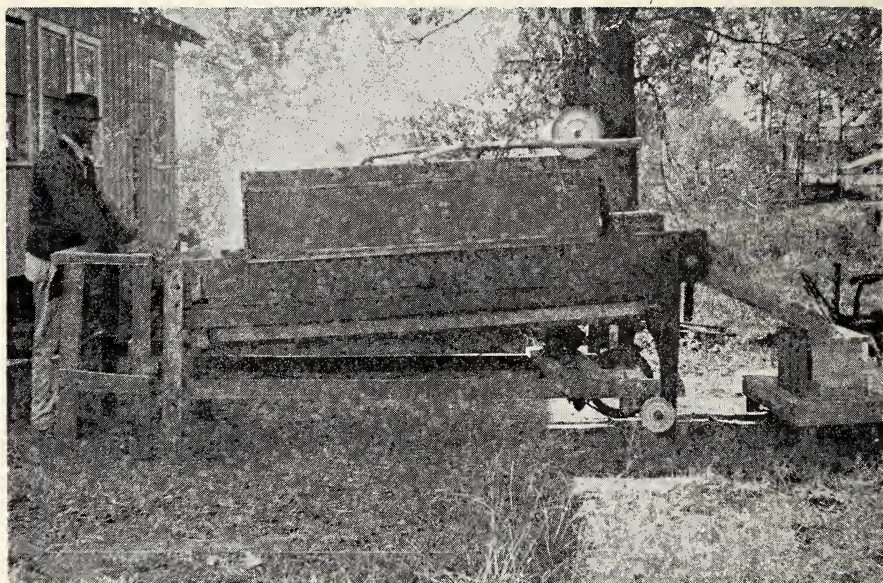


FIGURE 1. Dusting machine for treating seed sweet potatoes with DDT.

2,4-D killed all large volunteer sweet potato plants growing in a cornfield, but additional plants sprouted after this application. The poorest results were obtained on mother rows where plants had been cut twice for transplanting, probably because the plants and the leaf surface were smaller than in the other tests. A second application on these rows gave satisfactory results.

In a small, replicated field-plot experiment sweet potato seedlings L 156, L 187, and L 244, developed by the Louisiana Agricultural Experiment Station, were less infested than other seedlings and varieties tested with them. L 187 showed low weevil infestation in every test

in which it has appeared and was the only one that has shown consistently low infestation. This seedling and the others showing low infestation are high in moisture and carotene.

—K. L. COCKERHAM AND P. K. HARRISON.

Cole Crop Insect Investigations During 1949¹

Investigations for the control of cabbage caterpillars and the turnip aphid were continued during 1949. Five replicated, small-plot experiments, three in the spring and two in the fall, were conducted for the control of cabbage caterpillars on cabbage, and six similar experiments, two in the spring and four in the fall, for the control of the turnip aphid. Major emphasis was placed on the evaluation of piperonyl cyclonene, piperonyl butoxide, n-propyl isome, and methylated naphthalene in rotenone, pyrethrum, and DDT dust mixtures. The insect populations, however, were too low for worthwhile results, except in the fall experiments on the turnip aphid.

Against the turnip aphid on fall-grown mustard 1 per cent of piperonyl butoxide was more effective than 1 per cent of piperonyl cyclonene or 0.5 per cent of n-propyl isome in dust mixtures containing 0.25 per cent of rotenone. Dust mixtures at twice these strengths were tested in three experiments against the turnip aphid on fall mustard without any appreciable differences, and gave from 90 to 99.5 per cent control. A dust mixture containing 0.5 per cent of rotenone and 2 per cent of methylated naphthalene gave from 94 to 98 per cent control, and a 1 per cent rotenone dust gave from 90 to 98 per cent control.

Aldrin and dieldrin sprays were tested against the turnip aphid in one experiment. One pound of aldrin per 100 gallons of water gave 62 per cent control, and 0.2 pound of dieldrin 58 per cent.

—K. L. COCKERHAM AND P. K. HARRISON.

Irish Potato Improvement Program¹

Most of the investigations of potato breeding for the Southeastern States are conducted cooperatively between the Louisiana Experiment Station and the United States Department of Agriculture.

The potato breeding work consisted of producing seed of crosses in Baton Rouge and at Crossville, Tennessee; growing and transplanting first year seedlings in the greenhouse at Baton Rouge; increasing seedlings at Crossville, Tennessee; distributing seedlings and varieties to cooperating states; testing seedlings for resistance to late blight, early blight, and to scab; and conducting yield tests of the most promising seedlings and varieties.

In addition to the production of our own seed, true seed is received from the United States Department of Agriculture, from crosses made in Beltsville, Maryland, providing for the combination of disease resistance and other characters desirable for the production of potatoes in the South.

¹In cooperation with the Louisiana Agricultural Experiment Station.

The seedlings are tested for resistance to late blight and early blight in the greenhouse by spraying the plants growing in three-inch pots with spores of the causal organism and placing these plants in large moist chambers.

The susceptible ones are discarded and tubers from the resistant plants are saved to be increased in the plots at Crossville, Tennessee.

Progenies from scab resistant parents are transplanted in soil in a cold frame, previously mixed with soil from a plot badly infested with scab. At two-week intervals spore suspensions of several strains of the causal organism, *Actinomyces Scabies*, are poured around the plants. At digging time, all tubers from plants showing scab lesions are discarded, and the resistant ones are saved to be planted for increase and additional observation at Crossville, Tennessee.

Several varieties and seedlings are available that are highly resistant to late blight and to scab. Most of these seedlings are lacking in some other commercial qualities, and additional breeding will be necessary to combine these qualities with disease resistance.

Some of the late blight resistant varieties developed by the United States Department of Agriculture in Maine proved to be well adapted to growing conditions in the South. One of these, namely Kennebec, remained free from blight in a yield plot at Thibodaux, Louisiana, in the spring of 1949, when all the susceptible varieties were killed by this disease, and it outyielded the Bliss Triumph variety commonly grown in the South, by eighty per cent.—THEODORE P. DYKSTRA.

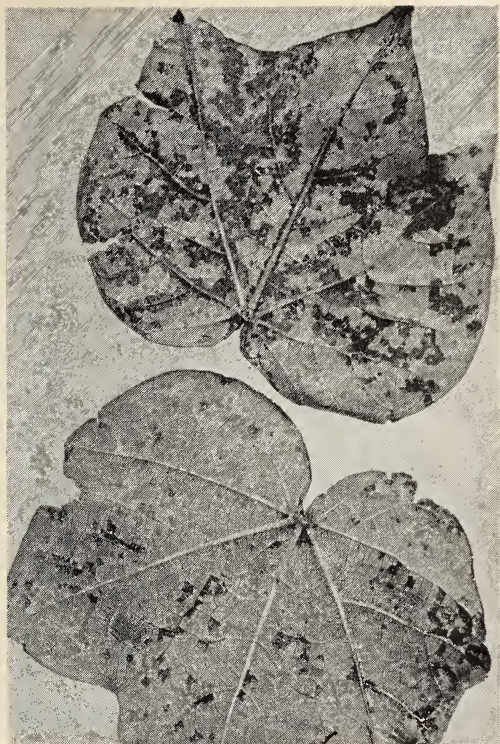
Cotton Disease Investigations¹

Bacterial Blight

Bacterial blight or angular leaf spot continues to be of concern to cotton growers in Caddo and Bossier parishes. This disease, caused by *Xanthomonas malvacearum*, was widely prevalent in the above area the past season and also developed to a somewhat less extent in other parts of the state. It developed early in the Shreveport area about the middle of June, and became progressively worse as the season advanced. By the middle of July the infection in many fields ranged from 75 to 100 per cent, resulting in partial defoliation of plants. It is difficult to estimate just how much damage this disease causes, but the continuing loss of foliage and spotting of bolls during the season is considerable, and the yield is no doubt affected.

Studies are now in progress toward developing blight-resistant strains of cotton adapted to Louisiana. Stoneville 20, a blight-resistant strain discovered in Tennessee, has been crossed with Deltapine 14 and the F₁ population grown in the greenhouse. The F₂ population of this cross will be studied under inoculation and the resistant plants backcrossed to the Deltapine parental line. Also, strains from Texas

¹ In cooperation with the Louisiana Agricultural Experiment Station.



Bacterial blight or angular leaf spot on upland cotton leaves. Note the water-soaked appearance and the distribution of the spots between and along the veins.

Bacterial boll rot, caused by the same organism that affects the leaves.



representing two backcrosses of Empire Wilt from the original cross, Empire X Stoneville 20, were studied under inoculation last season at the Red River Branch Station. —D. C. NEAL AND F. W. SELF.

Breeding and Testing for Fusarium Wilt Resistance

During the past season several strains of cotton representing selections, hybrids, and backcrosses, were again planted in progeny rows on wilt-infested soil. These strains showed high wilt tolerance in 1947 and 1948 in field trials and were selected from progenies having superior fiber properties, such as lint percent, upper half mean and mean length of fibers, uniformity, and tensile strength. Among the strains studied, the more promising from the standpoint of wilt resistance and fiber quality are Coker 100 Ga. 97-2-2-2, Deltapine 6, Stonville 2-B-R, Louisiana 33, Coker 100 Ga. X Deltapine 6, Deltapine 6 X Delfos 6102, and Deltapine 6 X Delfos 6102 X Deltapine 6. Strength of fiber of several of the Deltapine 6 progeny selections was above average and it appears that this strain is a contributor to strength in crosses made with other lines.

For subsequent study a total of 495 progeny-row selections were made in the 1949 wilt plots.

Satisfactory testing of strains for wilt resistance also was accomplished in the greenhouse by growing the plants in an artificially wilt-infested sand-soil mixture and by agar-culture inoculation.

—D. C. NEAL AND J. R. COTTON.

Effect of Seed Treatment, Seed Type, and Planting Rate on Seedling Survival and Yield

During the past year experiments were conducted at the Northeast Louisiana Branch Station at St. Joseph and the Red River Valley Branch Station at Curtis to compare the effects of chemically-treated, reginned and acid-delinted seed on stand improvement and yield and to determine optimum rates of planting. Rates of planting were 2, 3, 4, and 6 seeds per foot, hereinafter referred to as 1X, 2X, 3X, and 4X rates. For seed treatment, Dow 9-B was used at St. Joseph and Ceresan M at Curtis.

At St. Joseph, acid-delinted seed gave a higher seedling survival, the difference over reginned being highly significant. The number of seedlings for the Deltapine variety also was higher than that for the Coker, the varietal difference also being highly significant. Rates of planting did not give significant differences in surviving seedlings. At Curtis, seedling survival was not affected by either seed type, variety, or rate of planting. Several days of dry weather following planting may have been responsible.

At St. Joseph, the only factor which affected the yield was rate of planting. The mean yields of plots planted at the 1X, 2X, and 3X rates were approximately the same, 8.9 pounds of seed cotton, whereas that for the 4X rate was significantly lower, 7.8 pounds.

At Curtis, only the highest planting rate gave a significantly better yield, the mean being 12.7 pounds. The mean yields for the other rates were in the order named 3X, 10.6 pounds; 2X, 10.1 pounds, and 1X, 9.8 pounds. In the case of variety and rate comparisons, Deltapine was highest at the higher rate level, but with this exception there was no significant difference in the yield of the two varieties.

—D. C. NEAL, C. B. HADDON, J. Y. OAKES,
J. A. HENDRIX, AND E. C. BASHAW.

Finacial Statement

Agricultural Experiment Stations Research Funds

July 1, 1948 - July 1, 1949

FEDERAL RESEARCH FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones	Hope-Flannagan	
					RRF	RM
Appropriation	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$11,500.00	\$55,365.98

EXPENDITURES—FEDERAL FUNDS

Salaries and Wages	13,534.97	13,084.77	45,048.52	41,987.80	7,371.89	37,005.90
Supplies and Expense	758.78	923.99	8,757.25	7,945.26	661.18	5,634.69
Travel	97.15	801.32	1,745.17	2,240.93	661.32	2,829.43
Capital Outlay	609.10	189.92	4,449.06	13,745.97	1,802.84	11,150.35
TOTAL	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$10,497.23	\$56,620.37

EXPENDITURES—STATE FUNDS

	Bankhead-Jones State Offset	State Non-Offset	Other State Funds*	Research Fellowships†	Total All Funds
Salaries and Wages	\$63,638.35	\$188,503.36	\$259,892.64	\$22,996.79	\$535,031.14
Supplies and Expense	24,274.73	33,663.23	151,396.68	23,704.10	233,038.74
Travel	3,692.71	9,606.78	15,324.04	3,371.95	31,995.48
Capital Outlay	7,352.32	28,948.91	182,284.40	10,922.53	229,508.16
TOTAL	\$98,958.11	\$260,722.28	\$608,897.76	\$60,995.37	\$1,029,573.52

*Includes appropriations for sub-stations and special Legislative Appropriations.

†Does not include funds appropriated for Plant Expansion.

Agricultural Experiment Station Staff

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Lawrence V. George, B.S., Editor
Nathalie Poirier, Executive Secretary
Frances W. Macy, Secretary to the Director (appt. August 10, 1949)
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¹Jerry M. Law, M.S., Research Associate (resigned June 30, 1949)
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¹Felix E. Stanley, M.S., Associate Agricultural Economist (appt. October 17, 1949)
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- ¹Thomas Everette Patrick, M.S., Assistant Dairy Husbandman
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- Clayton C. Moreland, B.S., Assistant Chemist
- Gerald Z. Smith, B.S., Research Associate (appt. Sept. 1, 1949; resigned Feb. 28, 1950)

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- ¹Bryant A. Bateman, Ph.D., Forester
- ¹A. Bigler Crow, M.F., Assistant Forester
- ¹Leslie L. Glasgow, M.S., Assistant Forester
- ¹Charles O. Minor, M.F., Assistant Forester
- ¹William M. Palmer, M.F., Associate Forester
- ¹Richard F. West, M.F., Assistant Forester

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- ¹Laureame McBryde, B.S., Research Associate
- ¹Dorothy S. Moschette, M.S., Associate Home Economist
- Echo L. Price, M.S., Research Associate (appt. Aug. 1, 1949)
- Cecelia D. Pudelskewicz, M.S., Assistant Home Economist (resigned July 4, 1949)
- Margaret Reynolds, B.S., Research Assistant (resigned June 30, 1949)

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- Rita Belle Attaya, M.S., Research Assistant in Horticulture

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 Teme P. Hernandez, Ph.D., Assistant Horticulturist (located at Chase, La.)
 Turney Hernandez, M.S., Assistant Horticulturist (appt. Feb. 1, 1949; re-
 signed Sept. 15, 1949)
 August E. Kehr, Ph.D., Associate Horticulturist (appt. March 1, 1950)
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 1St. John Poindexter Chilton, Ph.D., Plant Pathologist
 Preston H. Dunkelman, M.S., Assistant Plant Pathologist
 Irvin L. Forbes, Ph.D., Plant Pathologist; Assistant Director of Experiment
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 Ernest R. Stamper, M.S., Assistant Plant Pathologist
 Eugene C. Tims, Ph.D., Associate Plant Pathologist
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 resigned Jan. 31, 1950)
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 William A. Johnson, B.S., Research Associate (resigned Sept. 20, 1949)
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 2Alva Burl Watts, M.S., Assistant Poultry Husbandman

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'Leland C. Grumbles, D.V.M., Assistant Veterinarian (resigned May 18, 1949)
'Robert B. Lank, D.V.M., Associate Veterinarian
Helen Elizabeth Levy, B.S., Assistant in Veterinary Science
Roy L. Mayhew, Ph.D., Parasitologist

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James L. Heath, Jr., Assistant in Animal Industry
John C. Taylor, M.S., Research Associate in Horticulture

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Thomas Hansbrough, B.S., Research Associate in Forestry (appt. June 16, 1949)
Henry C. Willis, Jr., M.S., Assistant Agronomist (resigned July 21, 1949)
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Weldon A. Nipper, M.S., Assistant Animal Husbandman

RICE EXPERIMENT STATION, CROWLEY

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David E. Black, B.S., Research Associate in Agronomy
George L. Coonrod, B.S., Assistant Agricultural Engineer (appt. June 1, 1949)
DeBlanc A. de la Houssaye, M.S., Assistant Agronomist, U.S.D.A.
J. Mitchell Jenkins, B.S., Superintendent (retired)
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Roy Jean Micars, B.S., Assistant Agronomist (appt. Nov. 1, 1949)

SOUTHEAST LOUISIANA DAIRY & LIVESTOCK EXPERIMENT STATION, FRANKLINTON

H. DeWitt Ellzey, Jr., M.S., Assistant Agronomist; Superintendent
Billy D. Nelson, B.S., Assistant Dairyman

WEST LOUISIANA EXPERIMENT STATION, DeRIDDER

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LeVernon Beaubouef, M.S., Assistant Agronomist (resigned Dec. 31, 1949)
Harold E. Harris, B. S., Research Associate in Agronomy (appt. Feb. 15, 1950)

UNITED STATES DEPARTMENT OF AGRICULTURE

(Located at State Station, Baton Rouge, La.)

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Theodore P. Dykstra, Ph.D., Senior Pathologist
P. Kips Harrison, M.S., Assistant Entomologist
Otto Mackensen, Ph.D., Associate Apiculturist
David C. Neal, Ph.D., Senior Pathologist
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Hugo Stoneberg, M.S., Associate Agronomist
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¹Part-time teaching.

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Research In Agriculture

ANNUAL REPORT, 1949-50

AGRICULTURAL EXPERIMENT STATION

W. G. TAGGART, Director

Louisiana State University
and
Agricultural and Mechanical College



Research in Agriculture

1949-50



ANNUAL REPORT



AGRICULTURAL EXPERIMENT STATION

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



Compiled by I. L. Forbes from Reports of Heads of
Departments and Project Leaders

Year Ended June 30, 1950

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Letter of Transmittal

Baton Rouge, Louisiana

April 1, 1951

GOVERNOR EARL K. LONG

BATON ROUGE, LOUISIANA

My Dear Sir:

I have the honor to transmit herewith, through the Dean of the College of Agriculture and the President of the Louisiana State University and Agricultural and Mechanical College, the report of the work, receipts, and expenditures of the Louisiana Agricultural Experiment Station for the year 1950, as required by the Hatch Act, which provided for the establishment of agricultural experiment stations in the several states.

Copies of this report will be sent to the United States Department of Agriculture in Washington, D. C., and to the other experiment stations, as required by the Hatch Act, and a sufficient number will be printed to enable us to supply members of the Legislature, Public Boards, libraries, and leading agriculturists.

Very respectfully,

W. G. TAGGART, *Director*
Louisiana Agricultural
Experiment Station

The Cover

Johnson grass infestations on many sugarcane plantations of Louisiana have become very serious in recent years. Research by members of the Sugar Industry, and by the Experiment Station, has shown that a combination of cultivation, chemicals, and some hand labor can bring these infestations to a reasonable level.

The use of fallow plowing, or summer plowing, in the year no cane is grown has been very successful in destroying the large Johnson grass plants and their rhizomes. It is then necessary to use chemicals to prevent reinfestations from seedlings, as many plantations have large numbers of viable Johnson grass seed in the soil. 2, 4-D as a preemergence spray followed by flame cultivation, and TCA as a preemergence spray, each has given as high as 95 per cent control of seedlings. Either of these practices together with hand roguing will permit the growing of a much cleaner plant cane crop after fallow plowing than will the customary hoeing.

The use of TCA on the drill, immediately after shaving and off barring, and before the rhizomes have sprouted in the spring, has suppressed Johnson grass sufficiently in badly infested stubble cane, to raise an economic crop. The picture on the cover shows hoed stubble cane on the left and TCA-treated stubble cane on the right in a test on Evergreen Plantation in 1950. Johnson grass suppression in the treated plot was very good and yields were increased approximately 6 tons to the acre.

Agricultural Chemistry and Biochemistry

Human Nutritional Utilization of Carotene from Sweet Potatoes

One objective of this department is to include in its nutrition studies problems directly applicable to human nutrition. A study of the factors affecting the human nutritional utilization of carotene in sweet potatoes was started in 1948. In the Annual Report for 1948-49 a description was given of a two-months controlled metabolism study in which eight LSU student volunteers were used as subjects. Since then, the work has been continued along similar lines. Early in 1950 a group of four men and two women ranging in age from 19 to 25 years was selected from LSU student volunteers, none of whom had participated in the 1949 experiment. The 1950 experiment covered a period of 92 days and involved comparisons of the effects of adding eight dietary supplements to a medium-carbohydrate basal diet devoid of carotene and vitamin A but otherwise complete. The eight dietary supplements were: casein, thiamine, lactalbumin, casein plus cystine, skim milk, skim milk and sweet potatoes, sweet potatoes cooked with fat, and sweet potatoes cooked without fat. Complete records of daily food intake, carotene and vitamin A values of blood samples taken every three days, quantitative daily collection of excreta, fortnightly measurements of the basal metabolic rate, and daily records of physical activity were obtained. These materials for 1949 and 1950 from fourteen human subjects represent a total of 1,056 "subject-days" of controlled metabolism experiments. All of the pertinent chemical analyses have not yet (December, 1950) been finished, but the partial data so far obtained indicate the following: (1) A direct relationship between the blood values of carotene and vitamin A does not exist. (2) The blood values of vitamin A are greatly influenced by the quality and the quantity of protein in the diet. For example, in human beings on a diet devoid of carotene and vitamin A but otherwise complete, the addition of skim milk or lactalbumin to the diet immediately caused a sharp increase in the blood vitamin A; casein was without effect, while casein supplemented with cystine produced a decrease in the blood values of vitamin A. Some of the evidence suggests that chocolate augments the effect of skim milk. (3) With sweet potatoes furnishing the only source of a constant daily carotene intake, a change from a high-meat diet to a medium-

carbohydrate diet was accompanied by a sharp decrease in both carotene and vitamin A blood values. (4) About 55 per cent of the carotene in ingested sweet potatoes is excreted in the feces. This value varied, however, from subject to subject and ranged from 44 to 63 per cent for different individuals. (5) The availability of carotene in sweet potatoes for human nutrition compares favorably with that reported in the literature for other vegetables such as carrots and spinach.

—WILLIAM H. JAMES, MARTHA E. HOLLINGER,
MARIE E. SATMARY, AND BOBBIE DELANEY.

The Use of Fluoride Ion in the Photometric Determination of Blood Glucose Using Alkaline Ferricyanide as the Oxidizing Agent

A major difficulty in the determination of blood glucose using alkaline ferricyanide as the oxidizing agent has been the uncertain development of stable sols of Prussian blue. Methods commonly used require a relatively long period of time for development of maximum absorption. Reproducibility is usually poor, and high and variable blank values are common. It was found that variable and high blanks disappear when tubes are routinely cleaned with hot trisodium phosphate solution. Maximum color development in five minutes with no decrease for one hour or longer can be obtained by the addition of potassium fluoride to the alkaline ferricyanide solution. Other fluorides are less satisfactory. Best results are obtained with ferric sulphate as the source of the ferric ion. All reagents are quite stable. The range, relative error, etc., with these reagents is equal or superior to any other method using this principle.

—J. G. LEE.

APF Supplements in the Ration of the Growing Chick

It is well known that protein supplements obtained from animal sources will improve rations made from vegetable feeds. Recent research work indicates that this improvement may be caused by vitamin B₁₂ and related factors contained in these feeds. Feeds of vegetable origin, on the other hand, are as a rule a poor source. Materials containing high amounts of vitamin B₁₂ are available for general use and are sold under the name APF supplements. As research work elsewhere has indicated that straight vegetable diets properly supplemented with certain APF materials will give excellent growth when fed to chicks, additional research on this problem was needed.

In the first phase of this experiment it was found that an all-vegetable protein ration (high in corn and soybean meals) was improved by supplementing with: (1) 0.16 per cent APF; (2) 0.32 per

cent APF; (3) all known B vitamins, or (4) 0.16 per cent APF plus all other known B vitamins. The greatest improvement was obtained by adding B vitamins to the APF. This indicates that the vegetable diet used in this study was low in both APF and the B vitamin and should be supplemented with both if good results are to be expected.

In the second phase of this experiment fish meal was included in the basal ration. It was found that the APF supplement did not improve this ration; however, the addition of other B vitamins gave a significant improvement. These results showed that this basal ration contained sufficient APF but was improved by the B vitamins.

The third phase of this experiment indicated that chicks hatched from eggs obtained from hens receiving neither APF nor animal protein had a more critical requirement for APF than chicks obtained from hens receiving an animal protein in their diet.

The fourth phase of this experiment indicated that there was no advantage in adding either B vitamins or APF supplement if the diet contained sufficient animal protein and a natural source of the B vitamin. The ration used in this trial contained 7.5 per cent animal protein and a substance high in the B vitamin.

The APF used in this experiment did not contain an antibiotic.

—A. TILLMAN.

Further Observations on Experimental Lathyrism Induced by Feeding Singletary Pea Seed

Albino rats were again used as the experimental animal. No sex difference with respect to susceptibility could be found. A difference has been reported on clinical lathyrism in man. The calcium and phosphorus content of fat free tibias of both sexes were found to be the same in both control and experimental animals. The malformation of the bones apparently does not extend to calcification. The addition of methionine to the experimental diet prevented the occurrence of the paralysis. This confirms the claim of Diaz. Lathyrism is then to be included in that group of toxicities which can be prevented by either methionine or alpha-tocopherol.

—GEORGE ANN SISCO AND J. G. LEE.

Turbidimetric-Titrimetric Discrepancy in Oleic Acid Stimulation of *Lactobacillus casei*

Previous reports from this laboratory have described the growth promoting effect of oleic acid as a biotin substitute in the nutrition of *Lactobacillus casei*. Also reported were certain peculiarities of growth in the presence of oleic acid, i.e., high cell production accompanied by low acid production. The removal of this discrepancy

has been the object of recent experiments. Of the many substances and variations in procedure tested, none proved completely effective in overcoming the disparity. The use of an oleate ester produced comparable cell and acid production at pH 5.0-6.0. Under other conditions, the ratio of cell production to acid production was usually approximately 2.0 when both were expressed as micromicrograms of apparent biotin. At high pH values the ratios were much higher. Since a similar phenomenon was observed in cultures grown on lipide-free medium of abnormally low glucose content, it is suggested that the depressed acidity is caused by interference of glucose absorption by the lipide.

—VIRGINIA R. WILLIAMS AND E. ANNE ANDREWS.

Shrimp Studies

Black Spot or Melanotic Shrimp—Black spot of shrimp, or black shrimp, is a condition which develops in shrimp, both whole and headless, during refrigerated storage. It results in the formation of pronounced black bands where shell segments of the tail overlap, giving a banded or zebra appearance to the tail. The tail and head fins become black, the crawling legs change color first at the joints, and this finally progresses over the entire leg, while the swimming legs become black at the tip ends. The carapace or head shell and gills also become black. The liquid which exudes from the shrimp is black and alkaline in reaction.

The variation in the extent and location of the development of black spots on different lots of shrimp suggested that microorganisms were involved. After a preliminary investigation yielded a mold that would cause a blackened area on heat sterilized shrimp held at room temperature, an intensive study of the microbial flora in relation to black spot development was undertaken.

Although eighteen different media were inoculated with material from several hundred samples of black spots, no microorganisms were isolated that would produce a blackening on the media or when inoculated onto fresh shrimp stored in cracked ice. The mold that had been isolated grew so slowly at 32-35° F. that it was considered of doubtful importance. It was also found that black spots would not develop on shrimp stored under anaerobic conditions at 32-35° F., although numerous anaerobic bacteria were present. The possibility of sulfide production by microorganisms as the cause of the blackening was discounted when it was found that the concentration of hydrogen sulfide producing bacteria was no greater in the black spots than in unspotted areas of the shrimp. Paraffin sections of black spots did not reveal any bacteria or fungi in the tissue in any appreciable numbers. It was not possible to show an increased rate or amount of spot development on fresh shrimp that were heavily inoculated with black spots from other shrimp. Dip-

ping of fresh shrimp in solutions of Roccal, peracetic acid, the sodium salt of dehydroacetic acid, sodium propionate and Krimo-Ko gel plus ascorbic acid did not affect the rate or extent of black spot development, although the bacterial count after treatment by the first three materials was appreciably lowered. Treatment with sodium bisulfite and propylene oxide were the only chemical means found that would prevent black spots, and the propylene oxide caused the development of the pink color typical of cooked shrimp.

The failure to isolate any microorganism of possible significance from black spots, the development of black spots on shrimp with a very low microbial count, and the inability to transmit the black spots even with heavily spotted tissue as the inoculum, strongly suggested that the black spots are not caused by microorganisms and do not result from chemical changes in the shrimp brought about by microbial activity. This led to an investigation of the importance of enzyme systems inherent in the shrimp.

Whole shrimp suspended in water in flasks stoppered by rubber or cotton plugs and stored in crushed ice for 5 days do not develop black spots, but if air or oxygen is bubbled through the system they will develop black spots in 3 to 4 days. These results prove that oxygen is necessary for black spot development, and strongly suggest an oxidative enzyme system is involved. Further research has shown that dihydroxyphenylalanine (dopa) is rapidly oxidized by whole shrimp and extracts of shrimp. In the case of the former typical black spots develop. Catechol is likewise oxidized, red spots developing however instead of black spots. Further evidence that an enzyme system is involved are: boiling over a free flame for one minute either a water suspension of shrimp membranes or shells or a water extract of shells and membranes completely prevents development of black spots even in the presence of dopa; optimum pH for development of spots is approximately 7; development is inhibited by chemicals known to inhibit oxidase enzymes. The enzyme system has been shown present in the head, fins, legs, shell and membrane of the tail, but is not present in the tail flesh.

Since the brown and black pigments found widely distributed in nature and caused by oxidation of various phenols have long been known as melanin it is suggested that the terms black spots and black shrimp be discarded and that these be designated as melanotic shrimp, the formation of the pigments as melanogenesis and the abnormal pigmentation as melanosis.

With the cause of melanotic shrimp known, control measures can be recommended. In order to have melanosis three conditions must be fulfilled, namely, the enzyme system and the chemical substance which is changed to a pigment must be present and lastly air or oxygen must be available.

If any one of these three is lacking melanogenesis can not occur.

Since the former two are naturally present in shrimp, preventive measures consist in limiting availability of or exposure to oxygen. This can be accomplished either by keeping the shrimp out of contact with air or by treatment with sodium sulfite or sodium bisulfite or other reducing substances which compete for the oxygen and thereby prevent melanogenesis.

—E. A. FIEGER, HARVEY LEWIS, AND J. ALFORD.

Frozen Cooked Shrimp—Boiled shrimp are a delicacy when served with various cocktail sauces, as salad, in gumbo, or as an entree but these entail time consuming and unpleasant preparation. Shrimp which have been boiled and peeled before freezing would certainly be welcomed by those engaged in meal preparation, providing they compare favorably with the fresh cooked product in quality.

Since frozen cooked shrimp become less tender during storage at 0° F., a series of studies was conducted in an endeavor to overcome this difficulty. Of the 22 different treatments used the following two gave superior products: cooking shrimp in a solution containing in addition to salt a small quantity of disodium hydrogen phosphate, and cooking in the usual manner and freezing with the shrimp immersed in the cooking liquid. All the shrimp were cooked until palatable, which required eight minutes of boiling in a solution containing 5 per cent salt and 1 gram of Rex Crab Boil for each 100 grams of shrimp.

The samples packed in cooking liquid were excellent in flavor and not tough after 12 months frozen storage. The spice flavor had penetrated into the flesh and they were delicious when eaten without addition of further seasoning. The only objectionable feature was the light yellow to gray color of the surface of the meat. Those samples cooked in the phosphate solution were likewise tender but were not so flavorful as those packed in the cooking liquid. Their color however was normal.

—E. A. FIEGER.

"Aphythatosis"—a New Process for Drying Food and Other Products Affected by High Temperatures

This process consists in the use of dehumidified air at room temperature or at temperatures below those used in ordinary dehydration to dehydrate vegetables and other foods susceptible to higher temperatures. The process has been applied on a semi-plant basis in the laboratory for treatment of eggs to be frozen in the shell. Preliminary tests with other foods, especially vegetables, showed it to be very promising. The products dried by this method look and taste better, retain more ascorbic acid, and absorb more water during reconstitution than those dehydrated by the usual method of using higher temperatures. The length of time of drying and the

cost are about the same for the two processes. No denaturation of protein or case hardening occurs during the treatment as usually occurs in high temperature dehydration. Experiments are being conducted on a variety of Louisiana grown vegetables.

—SOCRATES KALOYEREAS.

New Tests for Detecting the Addition of Heated Milk to Raw Milk

The present methods of differentiating raw milk from heated milk are based on enzymatic tests. These tests are very sensitive in detecting small amounts of raw milk in mixtures with heated milk. But when the problem is reversed, that is, when a quantitative test is desired to check whether or not heated milk has been added to raw milk, the enzymatic tests (phosphatase, etc.) cannot be used safely. To deal with such cases two methods have been developed. One is microscopical and deals with the examination of crystallization patterns of lactalbumin when treated with copper chloride, and the other is a spectrophotometric test for lactalbumin in the heated milk.

—SOCRATES KALOYEREAS.

Storage Experiments with Brown Rice

The storage of whole brown rice in air-tight laminated foil bags has in the past proved successful in preventing rancidity and preserving vitamin content of the rice (see Annual Report for 1948-49, 1947-48). Similar treatment in the storage of finely ground brown rice was not successful in preventing rancidity for any appreciable length of time. After four months storage all samples on cooking had a bitter taste and displeasing odor.

—E. A. FIEGER AND VIRGINIA R. WILLIAMS.

Agricultural Economics

Milk Supply and Utilization in Louisiana

At the request of dairy farmers in early 1950, a study is being made to determine the source and utilization of the milk consumed in Louisiana. The Department of Agricultural Economics of the Louisiana Agricultural Experiment Station is cooperating with the Louisiana Department of Agriculture and Immigration in this research. The major objectives of the study are: (1) to determine the source, grade, type, volume, and price of whole milk marketed in Louisiana in 1949; (2) to determine the production of fluid milk and milk products in Louisiana in relation to consumption; (3) to estimate the potential demand for milk and milk products; and (4) to determine the adequacy of present processing facilities for handling the milk produced in Louisiana. The data were collected on a monthly basis in order that the seasonality of production and consumption could be studied.

TABLE 1. Number of Milk Plants by Type and the Volume of Milk Distributed, 1949, Louisiana

Type of plant	Number of plants	Pounds milk distributed	Per cent of total
Processor-Distributor.....	105	432,092, '87	97.0
Producer-Distributor.....	85	12,663,503	3.0
TOTAL.....	190	444,755,690	100.0

Although analysis of the information collected to January, 1951, has not been completed, it has been found that there is a substantial economic loss to the dairy industry because of inadequate facilities for processing the milk produced by farmers in excess of requirements for fluid use. This problem will receive further study in order that economically sound recommendations for its solution may be made.

—WILLIAM H. ALEXANDER, DAVID DANIEL, AND HASKELL SEAL.

Tung Nuts as a Farm Enterprise in Louisiana

The commercial production of tung nuts for oil is a relatively new farm enterprise in Louisiana. Although 41 orchards with more than 200,000 tung trees were reported in 1935, the 1940 crop was the first of sufficient size to be considered of commercial impor-

tance in the state. Since 1940 the production of tung nuts has increased at a rapid rate. By 1948, the farm value of the crop in Louisiana was almost three-quarters of a million dollars.

Tung orchard development is a comparatively long-time investment. The trees do not produce in commercial quantities before the fourth year and do not reach peak production until after the fifteenth year. Approximately 36.7 man hours and 10.5 tractor hours are required to develop one acre of tung trees to the commercial production stage. At 1948 prices, the cost of establishing and developing an acre of tung trees for three years was \$65.94. Man labor, tractor work, fertilizer, and interest on the investment were the major items of expense during the development period.

The cost of producing tung nuts varied inversely with yields per acre. In 1948, the average cost of producing a ton of tung nuts was \$115.20 with 500-pound yields, \$62.60 with 1,100-pound yields, and \$45.60 when a ton of nuts was produced per acre. The cost of man labor is one of the major items of expense in tung nut production, and reducing the amount of man labor required per acre affords one of the best opportunities for reducing production costs. Much of the hand labor for cutting weeds, briars, and tung sprouts can be eliminated by timely cultivations. The development of machines for harvesting tung nuts (now in the experimental stage) will provide additional opportunities for reducing production costs.

The cattle enterprise is well adapted to a farm organization built around tung nuts as a major cash crop. Cattle are able to utilize the grass in tung orchards with no appreciable damage to the trees. Grazing cattle in tung orchards makes it possible to reduce the number of cultivations, and also provides an additional source of cash farm income.

—JAMES A. MCDANIEL AND FELIX E. STANLEY.

Costs and Returns on Family-Type Sugar Cane Farms

The net cost for growing and harvesting a ton of sugar cane on family-type sugar cane farms in Louisiana increased from \$5.94 in 1948 to \$6.62 in 1949—an advance of almost 70 cents per ton. This cost included all direct and indirect items of expense in producing the sugar cane crop except for a charge for the value of the farmer's labor. The increase in the average cost per ton in 1949 made the cost for the year approximately the same as in 1946 and 1947, the two high-cost years immediately after the end of World War II. The increase in 1949 as compared with 1948 was due to declining yields per acre and somewhat higher costs for labor and materials. The sugar cane yield on the 500 farms studied for 1949 averaged 19 tons per acre as compared with 21 tons in 1948.

The average net return per ton to pay the operator for his labor declined from \$1.26 per ton in 1948 to \$0.72 per ton in 1949. The net

return per ton declined in spite of an increase in gross income of \$0.14 per ton, since advances in most cost items more than offset this slight increase in price. The average gross income per ton of cane sold, including conditional payments and molasses bonuses, varied from \$8.51 in 1947 to \$7.20 in 1948 and \$7.34 in 1949.

In the 1946-49 period, the cash return per hour of labor earned by family-type sugar cane farmers varied from 16 cents in 1946 to 28 cents in 1947, 26 cents in 1948, and 16 cents in 1949. In all years, these net cash returns per hour of labor as earned by the farm operator were below the minimum wage rates paid hired farm laborers in the area. In addition to cash returns, however, the farm operator had additional earnings in the form of non-cash perquisites. Total return per hour of labor, including both cash and non-cash income, varied from 37 cents per hour in 1946 to 55 cents in 1947, 52 cents in 1948, and 44 cents in 1949. The wage rate paid hired labor in this area averaged about 40 cents per hour during this period.

The 500 family-type sugar cane producers studied in 1949 had an average of 56 acres of crops per farm, produced 32 acres of sugar cane, and sold 572 tons of cane per farm. Fifty-five per cent of the farm operators owned all or a major part of the farms they cultivated, 15 per cent were cash tenants, and 30 per cent were share renters.

—J. NORMAN EFFERSON.

Costs and Returns for Raw Sugar Mills

The costs of manufacturing 100 pounds of raw sugar in Louisiana varied from \$3.59 for the 1943-45 period to \$5.63 in 1946, \$6.33 in 1947, \$5.87 in 1948, and \$5.53 in 1949. The net profit per hundred pounds varied from a gain of 13 cents in the 1943-45 period to 41 cents in 1946, a loss of 13 cents in 1947, a loss of 24 cents in 1948, and a gain of 28 cents in 1949. The relatively high costs and low returns in 1947 and 1948 were a result of stable to declining prices for raw sugar, increasing costs for labor and materials, and relatively low recoveries of sugar per ton of cane as compared with the wartime and prewar period. The change from a net loss to a net gain position in 1949 was caused mainly by a major increase in the recovery rate of raw sugar per ton of cane ground. The 26 mills studied for the 1949 grinding season averaged 168.6 pounds of raw sugar per ton as compared with 151 for the 1948 season. The 1949 recovery rate was the highest since 1942.

During the 13-year period 1937-49 in which annual financial studies have been made of the Louisiana raw sugar mill industry, certain major changes have occurred. The number of raw sugar mills in Louisiana has declined from approximately 75 in the 1937-39 period to 56 in 1949. The annual studies of costs and returns indicate that a major factor affecting returns has been the volume of business; most of the low-volume mills lost so consistently that

they were forced out of business. The remaining mills have been forced to make major capital improvements and increase grinding capacity in order to keep costs as low as possible. The average grinding capacity for the season has increased about 20,000 tons from 1937 to 1949 for the mills remaining in operation. The capital investment per mill has increased from less than \$400,000 in 1937 to more than \$650,000 in 1949. The increased volume ground was not sufficient to offset the higher capital costs. The capital investment per ton of sugar cane processed averaged \$4.73 in the 1937-39 period and increased to about \$7.00 per ton in 1949.

—J. NORMAN EPPERSON.

Mechanization of Cotton Picking in Louisiana, 1948 and 1949

Depending upon the level of mechanization used in preharvest operations, the labor required to hand-pick cotton constitutes from 50 to 75 per cent of the total man labor hours required to grow and harvest the cotton crop. Because of the large amount of labor required to pick the cotton crop by hand, development of mechanical means for harvesting cotton is significant. The number of one-row, spindle-type mechanical cotton pickers in the delta cotton areas of Louisiana increased from 65 in 1948 to 111 in 1949, an increase of 71 per cent.

Data on cost of operation were obtained from 38 mechanical pickers in 1948 and 83 in 1949. The number of acres harvested per picker was 170 in 1948 and 123 in 1949. The annual use per machine was 241 hours in 1948 and 213 hours in 1949 and the average number of bales harvested per 10-hour day was 7.4 in 1948 and 5.4 in 1949.

The average cash cost of operating a mechanical cotton picker per 10-hour day was \$85.48 in 1948 and \$89.68 in 1949. The average cost for labor, power, and machinery per bale was \$11.55 and \$16.61 for the two years, respectively. The variation in cash costs per bale between the two years was due primarily to spreading fixed costs over a smaller number of bales harvested per machine in 1949 as compared to 1948.

Loss in grade for machine-picked cotton as compared with hand-picked cotton amounted to \$11.25 per bale in 1948 and \$8.03 per bale in 1949. There was approximately one full grade differential between machine- and hand-picked cotton. The grade differential was pronounced early in the harvesting period in both years and as the seasons progressed, the quality differences tended to disappear. In some cases late machine-picked cotton was higher in quality than hand-picked cotton for the same period.

The average increase in the amount of cotton left in the field by a mechanical picker as compared with hand pickers was estimated to be 5 per cent in both 1948 and 1949. Since cotton left in the field is an economic loss to the producer, a charge was made

against the machines for this loss. The loss of lint and cottonseed, valued at the average price of machine-picked cotton, was \$8.92 in 1948 and \$8.03 in 1949.

TABLE 1. Total Cost of Mechanical Picking as Compared to Hand Picking in the Delta Cotton Areas of Louisiana, 1948 and 1949

Item	Cost per 500 lb. bale	
	1948	1949
Total labor, power, and machinery cost.....	\$11.55	\$16.61
Adjustment for loss in grade.....	11.25	9.35
Waste (average 5 per cent).....	8.92	8.03
Total cost of picking mechanically.....	\$31.72	\$33.99
Cost of picking by hand.....	44.80	40.33
Margin in favor of mechanical picking per bale.....	13.08	6.34

Possibilities for further decreasing the costs of mechanical harvesting include greater utilization of the machine, the use of skillful operators, better maintenance, proper storage, and ginning at specially-equipped gins.

—WARNER L. BRUNER, JR., AND FELIX E. STANLEY.

Fluctuations and Trends in Production on Louisiana Farms

Although final data are not available, the production of sugar cane in Louisiana in 1950 was greater than in 1949, while rice production was slightly less and cotton production was materially lower than in 1949. Preliminary data indicate that sugar cane farmers in 1950 had the best year experienced in recent years—owing largely to weather conditions which resulted in a sucrose content considerably above the average, combined with favorable yield per acre.

There have been changes in the relative volume of production among the various agricultural commodities during the last 25 years. Changes in quantity produced are due in part to shifts in the utilization of production resources and in part to variations in annual yield per acre due to such factors as the weather, diseases, and pests.

The volume of production of livestock and livestock products increased materially during the last 25 years. The five-year 1925-29 average index of volume of production was 78 as compared with an average index of 116 in the latest five-year period (1945-49). This represents an increase of 38 points, or 48 per cent. The index of production of meat animals averaged 64 from 1925 through 1929 and 119 from 1945 through 1949, an increase of 55 points, or 86 per cent.

The index of production of all crops averaged 81 from 1925

through 1929 and 85 from 1945 through 1949, an increase of four points, or five per cent. The average of the index of production of cotton for the first five years was 100 as compared with 66 in the last five years, a decline of 34 points, or 34 per cent. The average for rice in the comparative periods was 87 and 116, an increase of 29 points, or 35 per cent. Sugar cane shows a gain from an average index of 45 in 1925-29 to an average of 99 in 1945-49, or an increase of 113 per cent. For detailed data on agricultural production, refer to Louisiana Bulletin No. 444, "Agricultural Statistics for Louisiana, 1909-1949."

—J. P. MONTGOMERY.

Cotton Production Practices in the Upland Area of Northern Louisiana

A cooperative cotton production practices study was conducted in all of the major cotton-producing states in 1948. This report summarizes production practices found in the upland cotton area of Louisiana. Delta and Pine Land 14 was the most common variety of cotton planted. Cotton was seeded at an average rate of 21 pounds per acre with regular seed and 16 pounds per acre with delinted seed. More than 75 per cent of the farmers spaced their cotton by hill-dropping. Cotton planted solid in the drill was spaced by handchopping.

With one exception, all farms included in the survey used a complete fertilizer, of which 5-10-5 was the most common. Side-dressing with either nitrate of soda or ammonium nitrate was done on 22 per cent of the farms. The use of poison was closely related to the size of the cotton enterprise on each farm. Twenty-four per cent of the cotton acreage was poisoned on small farms, 45 per cent on medium, and 60 per cent on large farms. Calcium arsenate was the principal poison used and was applied at an average rate of six pounds per acre.

The average yield of cotton for all farms surveyed was 184 pounds of lint per acre. All cotton on these farms was picked by hand, and most of the acreage was picked over at least twice. Approximately 1,290 pounds of seed cotton were required to produce a 500-pound bale of lint. Workstock was the only source of power on small cotton farms and provided most of the power on the medium-sized farms. Almost three-quarters of the large farms reported tractors as the major source of power. The man labor requirements for producing cotton varied with the size of power unit used. With one-half row, mule-drawn equipment and yields of 184 pounds of cotton lint per acre, 84 man hours were required per acre of cotton. With similar yields, man labor requirements were 73 hours per acre for one-row, mule-drawn equipment, 61 hours for one-row, tractor-drawn equipment, and 58 hours for two-row, tractor-drawn equipment. Average wages paid for specific

farm operations were: cotton chopping, \$2.50 per day; cotton picking, \$2.15 per hundredweight of seed cotton; regular farm work, \$2.00 per day; and tractor drivers, \$3.00 per day.

—BILL BOLTON, FELIX E. STANLEY, AND WARNER L. BRUNER, JR.

Hogging-Off Corn and Soybeans

The practice of hogging-off corn and interplanted soybeans has been adopted by a large number of farmers in the delta cotton areas of Louisiana since 1944. A preliminary study of the economic aspects of the practice was made in 1948. Results of the study indicated that hogging-off corn and soybeans not only was a practical and economical method of harvesting the corn and soybeans, but also provided a profitable alternative source of cash income for delta farmers.

In view of the drastic decline in pork prices during 1949 and additional interest in hogging-off corn and soybeans resulting from cotton acreage restrictions in 1950, a more detailed study was conducted in the delta areas relating to 1949 conditions. In the course of this survey, data concerning costs, returns, and practices were collected from 38 farmers who had adopted the practice.

TABLE 1. Average Cost and Returns per Acre of Corn and Soybeans Hogged-Off, Louisiana, 1949

Item	Number dollars
Average total receipts per acre	\$321.28
Expenses:	
Cost of hogs purchased	128.24
Pasture cost	8.00
Feed while on pasture	41.04
Fence cost	8.15
Worming, vaccination, tankage, minerals and transportation	26.56
Cost of producing an acre of corn and soybeans	23.45
Selling costs	15.10
Interest on hogs	1.60
Miscellaneous (water, medicine, death loss)	7.15
TOTAL	\$259.29
Net return to land and management per acre of corn and soybeans hogged-off	\$ 61.99

An average gain of 822.4 pounds of pork was made per acre hogged-off in 1949. Eight hogs were finished per acre, with an average gain of 102.8 pounds per hog in 45 days. In other words, 6.46 bushels of corn were required per 100 pounds of pork gain when this practice was followed. In most cases, the farmers who were successful with this practice used top quality feeder hogs, and followed recommended feeding and sanitation methods.

The farmers interviewed planted corn at an average rate of 10 pounds per acre and soybeans at 32.4 pounds per acre. Strains of Funk's hybrid corn and Ogden soybeans were the most popular varieties used. Fertilizer was applied at the rate of 47 pounds of available nitrogen per acre. Estimated yields of 53 bushels of corn and 20 bushels of soybeans were obtained per acre. Practices followed by most of the 38 farmers interviewed were worming, mange and lice treatment, use of minerals, salt and tankage, vaccination, and provision of clean drinking water, wallows and shade for the hogs while in the corn fields.

—WARNER L. BRUNER, JR.

Farmer Business Cooperatives in Louisiana

During 1950, a survey of farmers' cooperative business associations in Louisiana was started. Visitations were made and pertinent information obtained from 114 cooperatives. Preliminary tabulations of members and patrons in the 114 cooperatives total 115,078. From observation and the limited data available on farmers participating in more than one business unit, it is estimated that roughly 50 per cent of the farm operators in Louisiana obtain marketing, processing, purchasing, livestock breeding, credit, or electric power services through a cooperative organization.

Sixty-seven processing, marketing, and purchasing organizations were found with an accumulated investment of approximately \$14,500,000. They had facility loans in the amount of \$2,582,247 borrowed from the Bank for Cooperatives in New Orleans. Thirteen electric power associations were supplying electric current to 73,691 rural establishments, and four freezer-locker plants were serving 2,067 rural patrons. The Louisiana Artificial Breeding Cooperative had 38 breeding circuits in which 5,276 farmers had registered 64,164 cows in the livestock improvement program. Credit was obtained by 18,597 farmers through the facilities of the 21 National Farm Loan Associations and the 9 Production Credit Associations located in Louisiana.

—BUEFORD M. GILE AND OLIN B. QUINN.

Economic Studies of the Louisiana Vegetable Industry

General Trends—The area planted to commercial truck crops, excluding potatoes, sweet potatoes and strawberries, in Louisiana has averaged about 32,000 acres since 1928. Acreage increased to nearly 40,000 acres in the late 1930's and averaged about 33,000 from 1940 to 1946, but has declined to less than 30,000 since then. Total production has followed about the same trend, varying from year to year as a result of weather conditions, diseases, insects, and other causes. Some vegetables have increased in importance, while others have declined. Shifts have occurred in the location of producing areas for some crops, and new areas have come into production.

Most vegetable prices have followed the trend of other agricultural prices, falling from the 1920's to a very low level in the early 1930's, then remaining low or rising slowly until World War II. During the war, most prices rose rapidly. Since then prices of some products have fluctuated about the high wartime level, while others have declined. Favorable prices have been accompanied by high costs of production and marketing, and have not always resulted in profits to growers.

Major market outlets are northern and eastern terminal markets in the large cities, nearby towns and cities, and local canning and freezing plants. The volume of shipments to out-of-state markets has been large in recent years, and the composition has changed. Sweet potato shipments have increased but there has been a decline in the movement of mixed vegetables and a tendency for producers to specialize in fewer crops. One factor responsible for this change has been the development of new vegetable areas in the irrigated sections of the West which grow a variety of vegetables in volume and assemble mixed cars with comparative ease. Trucks are moving an increasing proportion of vegetable shipments. Canning and freezing plants continue to be important outlets to many growers. The Louisiana vegetable industry can greatly increase its output to help meet the food needs of a nation mobilizing for defense if growers are given reasonable incentives and the supply of labor and materials is adequate.

—M. D. WOODIN.

Commercial Canning—Twenty of the 22 canning plants in the state operated during the 1949-50 season, processing 1,533,447 cases of fruits and vegetables valued at \$4,194,000. This was an increase of 51 per cent in volume and 61 per cent in value over the 1948-49 pack. Twenty-four fruits and vegetables, or combinations of them, were packed, although a few items made up the major part of the output. Fifteen of the 20 plants canned sweet potatoes. Sweet potatoes continued to be the most important product, comprising 72 per cent of the pack; okra and okra mixtures made up 16 per cent; snap beans, 4 per cent; and beets and tomatoes, 2 per cent each. No other individual product amounted to as much as 2 per cent of total output.

Few Louisiana canneries have ever operated at full capacity for extended periods of time. Normally they process fruits and vegetables only during the harvest seasons for these products, but some plants extend their operations by canning sweet potatoes, dry peas and beans, syrup, or sea foods. During the off-season the canning machinery and handling facilities usually remain idle. This unused capacity is available for the preservation of foods that might be needed during a period of national mobilization or war. Therefore, these canning plants represent a very valuable asset to the nation's economy which can be put into greater use without diverting equipment from other programs.

—G. E. KING AND M. D. WOODIN.

Shallot Production and Marketing—Louisiana produces nearly all of the shallots entering the major markets of the country. Commercial production is largely concentrated in the St. James Parish area and in the parishes along the Mississippi River to the south. Smaller acreages are found in the Pointe Coupee area, around Thibodaux, and in the Breaux Bridge section.

In 1950 a study of shallots was made in St. James Parish to determine the economic conditions and relationships under which the crop is produced and marketed. During the 1949-50 season, 1,075 acres of shallots were grown by the 61 commercial producers in the parish. Production amounted to about 18,300 barrels, and the average yield for the area was 17.1 barrels per acre. Preharvest costs averaged \$2.45 per barrel, and harvesting and farm marketing expenses amounted to \$2.60, or a total cost to growers of \$5.05 per barrel. Growers received an average price for the season of \$9.06 per barrel and had a net return of \$4.01 per barrel, or \$68.46 per acre.

Yield was the most important factor affecting per barrel costs and net returns per acre. As a general rule, farmers who made better yields followed these practices: (1) preceded shallots with a cover crop; (2) planted early; and (3) applied relatively large amounts of commercial fertilizers per 1,000 plants set. Quality of seed planted probably was closely related to yield, although accurate measurement of this factor was difficult.

Under usual conditions during the 1949-50 season, 33 hours of man labor and 6.5 hours of tractor time were required to grow an acre of shallots. Labor and power requirements for harvest and marketing varied with yield; during the 1949-50 season, 19 hours of man labor, 1.7 tractor hours, and 5.5 truck hours were required for harvesting and marketing under average conditions.

Marketing margins between the farmer and the terminal market dealer averaged \$8.76 per barrel. Local shippers took a margin of \$3.41 per barrel over the farm price, and terminal market wholesalers took a \$5.35 margin. The price spread between farmers and local shippers remained fairly constant throughout the season, while the spread between local shippers and terminal market dealers fluctuated with the market price of shallots. Of the consumer's dollar spent for shallots at the retail store, 35 cents went to the farmer and 65 cents to the various marketing agencies handling the product between the farmer and the consumer. This distribution of the consumer's dollar is about the same as the average for all fruits and vegetables in the United States.

—OLIN B. QUINN.

Green Pepper Production and Marketing—Commercial green pepper growers in Louisiana sold 246,000 bushels from the 1,700 acres harvested during the 1950 season. About half of the state's pepper acreage was in St. James Parish. A study of the operations of the 83 commercial growers in the parish in 1950 showed an aver-

age cost of production and marketing of \$1.27 per bushel sold, or \$100.74 per acre. Adverse weather conditions resulted in a smaller acreage harvested than in recent years, unfavorable yields, lower quality, and reduced returns. Growers averaged a net return of only \$9.50 per acre.

The cost of assembling and packing peppers and transporting them to major terminal markets amounted to about 90 cents a bushel. During the period when Louisiana peppers were on the market, the spread between the price growers received and the terminal market price averaged \$1.79 per bushel.

—RANDALL STELLY.

Marketing and Ginning Cotton in Louisiana

Cotton Quality Statistics—The Department of Agricultural Economics cooperates with the Cotton Branch of the Production and Marketing Administration in obtaining annual data on cotton quality. Quality reports for ginnings through November 30, 1950, indicate that the 1950 crop in Louisiana will average higher in grade than the 1949 crop. The grade index (middling white is 100) for ginnings through November 30 was 97.4 as compared with 95.5 for 1949, and the percentage of total ginnings tenderable on futures contracts was 92.4 as compared with 89.9 for 1949.

Grades of middling and higher accounted for 60 per cent of the 1950 crop as compared with 48 per cent for the corresponding period in 1949. The largest increase was in the proportion of cotton grading middling which accounted for 51.4 per cent of the 1950 ginnings and 40.4 per cent of the 1949 crop. The largest decrease was in the grade of low middling which accounted for only 4.7 per cent of the 1950 crop as compared with 12.3 per cent for 1949. The percentage of spotted cotton increased from 2.8 in 1949 to 4.6 in 1950.

The percentage of cotton ginned in Louisiana reduced in grade because of rough preparation during 1950 was 4.5 as compared with 5.8 for the corresponding period in 1949. Louisiana is the only state in the South Central area which had a decrease in the proportion of cotton reduced in grade because of rough preparation.

The average staple length in thirty-seconds inches is expected to be longer for the 1950 crop, 34.1 as compared with 33.9 for 1949, 33.5 for 1948, and 33.1 for 1947. Staple lengths of 1-1/32 inches through 1-3/32 inches comprised 97 per cent of the ginnings in 1950 and 93 per cent for the same period in 1949. The largest increase was in the proportion of ginnings 1-1/16 inches which accounted for 63 per cent as compared with 51 per cent in 1949.

—JAMES F. HUDSON AND R. O. SLAY.

Cotton Classing and Market News—The Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration in providing a free cotton classing and market news

service for eligible producers in Louisiana. The service is provided for by a federal law, commonly known as the Smith-Doxey Act, and has been available to Louisiana growers since 1938. Use of the service has increased the effectiveness of farmers in bargaining for the sale of their cotton, and has encouraged the production of improved varieties.

Membership in Smith-Doxey cotton improvement groups increased from 1,444 in 1939 to 28,468 in 1950. These members planted 648,624 acres of cotton in 1950, of which 586,728 acres were of the approved variety.

There were 36 approved producer groups in Louisiana in 1950. Through these groups the majority of the producers in the state were eligible to receive free cotton classing and market news service. The groups were located in 31 parishes, of which 23 had single parish-wide groups; four had parish-wide groups consisting of two groups; one had two small community groups; and three parishes had one small community group each.

The percentage of the total state cotton production classed for eligible groups increased from 0.1 per cent in 1939 to a high of 48 per cent in 1949. Estimates based on actual participation to January 8, 1951, indicate that approximately 25 per cent of the total ginnings of the 1950 crop will be classed. The decrease in 1950 was due to a short crop and a very favorable price situation during the harvesting season.

—JAMES F. HUDSON AND R. O. SLAY.^a

Cotton Ginning—The results of a study of cotton ginning made during the 1948 and 1949 seasons in South Louisiana in cooperation with the United States Ginning Laboratory emphasize the necessity for adequate drying capacity in this area. The findings of the study indicate that every gin in the area should be equipped with a 24-shelf tower drier or its equivalent in drying capacity. Gins that handle appreciable amounts of green, very damp cotton should also have an additional drier or at least an additional heater for applying heat to the seed cotton in the overhead cleaners or feeders, depending on the equipment in use. From a cleaning standpoint, gins should be equipped with modern huller front gin stands, extractor feeders or multiple unit extractors, and one overhead cleaner. Drying and cleaning combinations of this type could perform a creditable job of ginning on most of the cotton harvested in the South Louisiana area. However, it was found that potential benefits from drying, cleaning, and extracting cannot be fully realized unless timely repairs and replacement of saws, ribs, and the doffing mechanism of the gin stands are made, and unless the producer and management insist upon operating practices that insure loose seed rolls which are basic to smooth ginning.

Results of the study show that under normal weather conditions in the area standard or modern gins equipped with drying

facilities and auxiliary cleaning equipment produced lint with a seasonal average value per bale of \$2.50 higher than cotton ginned at substandard gins equipped with big drum feeders and without driers. By adjusting bale values to measure the difference due to rough preparation alone, it was found that standard gins produced lint with a per bale value of \$3.36 higher than gins without driers. The increased cost of ginning incurred by the standard gins in providing the additional facilities necessary to obtain the higher values ranged from \$0.30 to \$3.50 per bale depending upon the volume of cotton ginned. However, because of the larger volumes of cotton ginned by the standard plants, they were able to more than offset these additional costs and operated as a group at somewhat lower cost than did the substandard gins.

Results of the study emphasize the direct relationship which exists between the size of plant, volume of cotton ginned, and ginning cost per bale. In view of this relationship it is essential that gin owners carefully weigh any projected capital outlay against anticipated ginning volumes. In addition, gin operators should be on the alert to take advantage of every possible means to reduce operating costs through more efficient operation.

—JAMES F. HUDSON AND ROBERT A. MONTGOMERY.*

Adjusting Retail Outlets to Consumer Demand

Peaches—One of the points stressed in peach marketing during the 1950 season was to study the effect of size of prepackaged units on consumer demand during periods of high peach prices. Retail store sales of four-peach packages were compared with sales of eight-peach packages. When peaches were retailed at 23 cents a pound, the sales ratio in number of smaller packages to the larger was 1.4 to 1.0, and in pounds, conversely, 1.0 to 1.1. At 19 cents per pound both the number of packages and pounds purchased were favorable to the larger size in the ratios of 1.0 to 1.3 and 1.0 to 2.0, respectively. At either price the eight-peach package resulted in a larger volume of peaches being sold.

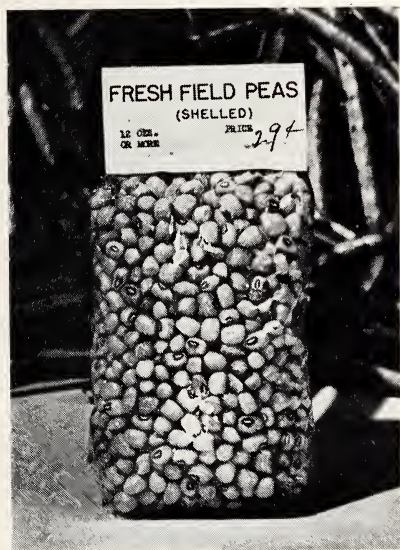
—J. M. BAKER AND P. L. HAWTHORNE.

Field Peas—During the summer of 1950, a group of North Louisiana peach producers tried growing field peas as a supplementary cash crop. The project was sponsored by a local cooperative association. The yield was good and the quality of the peas was excellent for table use, but available markets were inadequate. Four cents a pound at the cannery less two cents for hauling left little for the producer. Eight cents at the retail store was better but the quantity taken was too limited. It was obvious that the problem was to

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increase effective consumer demand. Based somewhat on the popularity of fresh field peas as a food item and the averseness of housewives to shelling peas, a project was initiated comprising three objectives: (1) to explore retail markets with new types of packages and displays with the view of increasing consumer demand; (2) to determine the best methods to use in preparing the peas for market and delivering them to the stores; and (3) to evaluate the different methods of marketing in terms of benefits to the pea growers.

The peas were shelled by mechanical means and prepackaged in units of popular size, as indicated by the accompanying picture,



Field peas prepackaged for retail store use.

and placed in selected retail food stores. To keep the product properly refrigerated was difficult. A continuous temperature ranging from 33° to 40° F. was needed. When transporting the packaged peas in open truck it was necessary to use large insulated boxes containing both dry and moist ice, or to put the packages in master cardboard containers with dry ice enclosed.

The prepackaged shelled peas were favorably received by merchants and consumers. Benefits to producers are indicated by these comparisons: (1) bulk peas delivered to cannery netted two cents a pound, or \$40.00 a ton; (2) bulk peas at the retail stores (containers being returned to producer) netted eight cents, or \$160.00 a ton; and

(3) the same quantity of bulk peas when converted to 900 pounds of shelled peas and prepackaged netted the producer, deducting marketing costs, 19.3 cents a pound, or a total of \$173.70. Additional study should contribute further to the improvement of methods and the efficiency of marketing field peas through the fresh market channels.

—J. M. BAKER.

Sweet Potatoes—During January, 1950, a study was conducted in selected food stores in Chicago to determine the effect of sizing sweet potatoes on consumer demand. For experimental tests the U.S. No. 1 grade was divided into three prescribed sizes, namely, small, medium, and large. Sixteen stores were carefully selected to give a good cross-section of the retail trade with respect to purchasing power, industry, type of community life, and race. Four were

designated as control stores, and 12 as test stores with four being assigned to each of the respective sizes. During the first week, or pre-test week, U.S. No. 1 sweet potatoes were displayed in all 16 stores and records kept of the value of gross store sales, fruit and vegetable sales, and sweet potato sales. During the second, or test week, U.S. No. 1's were continued in the control stores while each of the sizes was displayed in four test stores.

The influence of sizing sweet potatoes on retail sales was calculated by comparative changes in sales from the first week to the second week. Sales for the three different items measured declined from the first week to the second week. In the four control stores, gross store sales declined 7 per cent, fruit and vegetable sales 15 per cent, and sweet potato sales 35 per cent. The decline of sales in the 12 test stores during the same period and for the same items was 8 per cent, 16 per cent, and 27 per cent, respectively.

The decline in sweet potato sales was much less than the decline in gross sales and fruit and vegetable sales. It was noted also that the decline in sales of the medium size of sweet potatoes was 1 per cent less than that in the sales of the small and large sizes, all of which indicates favorable effects of sizing on sweet potato consumer demand.

—J. M. BAKER.

Meat Consumption and Marketing in Baton Rouge

A study of meat distribution in Baton Rouge showed a total consumption in 1949 of nearly 23 million pounds, or about 182 pounds per person. The national average was 173 pounds. About 85 per cent of the meat used in the city moved through local retail markets and food stores; the remainder was purchased directly from wholesale sources by restaurants, institutions, and other large users. Of the 197 markets handling fresh meats, only 17 per cent are classed as very large stores, yet they account for 63 per cent of retail meat sales.

One characteristic of meat consumption in Baton Rouge is the large amount of veal and baby beef eaten in relation to the consumption of heavy beef and other meats. While Baton Rouge consumers used 65 pounds of veal per person in 1949, the average United States consumer ate only about 9 pounds. On the other hand, United States consumption of beef was 64 pounds, but in Baton Rouge only 27 pounds. This large difference is accounted for in part by the preference for veal and baby beef in this area, the scarcity of well-finished heavy beef, and the custom of the local meat trade to call most baby beef "veal." Baton Rouge consumers also ate 63 pounds of fresh and cured pork, 25 pounds of poultry, and about 1 pound of lamb and mutton. United States consumption for these items was 68, 29, and 4 pounds, respectively. About 41 per cent of the beef and veal handled by retail distributors in Baton Rouge is

slaughtered locally, while 59 per cent comes from plants outside the area, mainly national packers.

—HENRY J. CASSO.

The Demand for and the Supply of Farms for Sale

The demand for farm real estate in Louisiana has increased since the outbreak of war in Korea and is likely to continue above normal until the outlook for peace has improved. In addition to the normal demand for farms from tenant farmers who reach the farm acquisition stage in their financial progress, many owner operators want to buy adjoining lands in order to utilize more efficiently their increased input of capital in the form of machinery and livestock. Urban residents with savings available for investment are interested frequently in buying land as a hedge against the anticipated further decreased purchasing power of the dollar. There is also a current demand from people living in industrial centers for small rural tracts to use as a haven of refuge. The wide publicity given to the devastating power of atomic weapons suggests the advantage of a place in the country where women and children might live, if a major war should come.

On the supply side, the number of farms for sale is below normal because farming is profitable, provides protection from inflation, and the farm home provides a relatively safe place to live. The supply of tracts in the country suitable for residence purposes is expansible, but the supply of tracts having habitable dwellings and for sale is limited.

As a result of increased demands for farm real estate and the less than normal supply, the farms sold in Louisiana, as in most other states, commanded higher prices during 1950. Lands in Louisiana that were sold during 1950 cost more than two times the price they would have brought in 1939. Land prices may be expected to rise still higher, depending to a considerable extent on the relation of the controls imposed on prices received by farmers to the cost of goods and services farmers must buy in order to produce. However, the number of sales of commercial farms under present conditions is expected to be very low. Government controls on the price of farm lands are not anticipated.

—BUEFORD M. GILE.

Agricultural Engineering

Anhydrous Ammonia Fertilizer Equipment

Laboratory tests during the past year have brought out many of the reasons for inaccuracies in the application of anhydrous ammonia. The size of the opening in commercial applicator feet as measured this past season was found to vary from $\frac{3}{64}$ to $\frac{1}{4}$ inch. Inserting unions or their fittings into a hose line, thereby reducing the diameter, and using hose lines of different size and length between regulator manifold and applicator feet, each gave uneven delivery of anhydrous ammonia. Manifolds made up of pipe nipples and tees gave unequal distribution. Variations as high as 60 per cent were found between the different applicator feet when six different makes were used on a pasture unit. Tests of regulators on quantities above the capacity for which they were calibrated showed inaccuracies of from 50 to 100 per cent.

In order to remove some of the causes of inaccuracies, drill holes in applicator feet out to at least $\frac{1}{4}$ inch and have all delivery hoses of the same length and diameter and free of loose particles; be sure that the diameter of the delivery line at no point is smaller than the orifice diameter. Before starting the season, be sure that metering valve is working properly and that there is no scale in valve and pipe lines.

Spring-trip applicator feet have not been found necessary for side-dressing of row crops. When applying anhydrous ammonia in orchards, meadows or new ground a spring-trip applicator is desirable.

—HAROLD T. BARR.

Cotton Mechanization

Experimental work conducted in cooperation with the Department of Plant Pathology has included pre-emergence sprays, post-emergence directed sprays, and flame cultivation as weed control in cotton production. The necessity for careful cultivation was apparent in all tests. Any disturbance of treated area of the drill exposes new weed seeds and reduces the effectiveness of the chemical sprays.

Mechanical tillage of the middles, or untreated portion of the row, should be frequent enough so that very shallow cultivation will give complete kill of the weeds present. Ordinarily, two or three cultivations will be required between the time the pre-emergence spray is applied and the first post-emergence spray. These and all subsequent operations should be conducted so that the seedbed will maintain its original shape as nearly as possible.

Particular emphasis should be given to the shoulder area of the row to prevent formation of ridges or depressions that will interfere with the application of post-emergence sprays and flame cultivation. At no time should fresh soil be thrown on the treated area of the seedbed.

As soon as the cotton reaches the size permitting flame cultivation, flaming should be utilized for continued control of weeds in the drill area.

—LAWRENCE E. CREASY AND L. E. COWART.

Seed-Piece and Mechanization Studies of Industrial Sweet Potatoes

In 1950 industrial type varieties were increased and tested at Chase, Louisiana. Seedlings and varieties transplanted from vine cuttings on May 31 yielded over 500 bushels of sweet potatoes per acre. Small whole-root plantings of Whitestar and L-244 yielded significantly less than slips of the same variety or seedlings. L-244 was found unsuitable to plant as small whole roots or seed-pieces because it sprouts much later than other industrial type varieties. Storage studies were made using two-ounce seed-pieces of Heartogold and Whitestar. Semesan Bel and Semesan Bel plus wax dip gave a very low incidence of rots, whereas the checks (untreated) had over 30 per cent of the seed pieces rotted.

A machine for digging, cleaning, and loading, all in one operation, the industrial type of sweet potato was designed, built, and tested this past season. The machine utilizes a standard Irish potato digger shovel and elevator chain, but deposits the potatoes from the elevator chain into a rotary barrel tumbler that completely separates the dirt from the potatoes. From the tumbler the potatoes go to a side elevator where they are delivered to a cart or wagon pulled alongside the harvester. The harvester also incorporates a shaver and disks that remove the vines from the row before digging. The machine is tractor mounted and hydraulically controlled. It is estimated that this harvester will do the work of 30 men when compared to the present methods of digging, hand gathering, and loading.

Testing on the second model of this harvester will be done next season so that all minor difficulties can be eliminated before the design is released for manufacture.

—WILEY D. POOLE AND TEME HERNANDEZ.*

Sweet Potato Machinery and Equipment

Tests were conducted to determine a suitable method to replace the hand operation of hoeing sweet potato plants. The following

* A staff member of the Department of Horticulture, Experiment Station, collaborating with the Department of Agricultural Engineering.

methods were tried: flame cultivation, pre-emergence sprays, and post-emergence sprays.

Results of the flame cultivation tests showed that sweet potato plants cannot stand the heat from the flame burners required to kill grass and weeds in the row.

For pre-planting weed and grass control, tests were conducted using a chemical weed killer ("Pre-merge," manufactured by Dow Chemical Co.). The spray was applied at the rate of six pounds per acre in 50 gallons of water six days before setting the plants. Treated plots showed an increase in yield of 25 per cent as compared to unhoed check plots. Disadvantage of this method is that transplanting must be done by hand, as a transplanter opener would disturb



Small tractor-mounted sweet potato digger developed by the
Agricultural Engineering Research Department.

too much of the soil between plants, thereby nullifying the effects of the chemical.

As a post-emergence spray a light oil (LHH1 by Lyon Oil Co.) was applied on the ground in the drill adjacent to sweet potato plants approximately 10 days after setting. Applications of 5, 10, and 15 gallons per acre were made as a drill spray.

One year's results indicate that a light oil spray can replace hoeing of sweet potato plants. One treatment of 10 gallons per acre gave complete control and two treatments of 10 gallons per acre were applied without damage to plants. One application of 15 gallons per acre gave complete weed control but also some stem damage to the plants. A treatment of 5 gallons per acre gave a fairly good

control but not complete control over all weeds. Two treatments of 5 gallons per acre gave good weed control.

First factory production model of the small sweet potato digger was tested and some small corrections were recommended for the final machine. The hydraulic control features coupled with the complete tractor-mounted idea provided excellent handling in small fields.

—WILEY D. POOLE.

Harvesting and Curing of Hay

Tests were conducted on the harvesting and barn curing of hay. It was found advisable to dry hay in the field down to about 35 per cent moisture before chopping it for barn drying. This means that hay must be cut in the afternoon of one day and picked up and chopped in the afternoon of the following day. The hay was blown into the curing chamber where warm air was used to cure it. The quantity of air blown through the hay amounted to about 20 CFM per sq. ft. of floor area. It was found that chopped hay can be put on the drier to a depth of about 10 feet if not walked on while loading. Handling and curing hay in the chopped form shows promise of success with little labor, but this method requires a higher investment in machinery. The best method for emptying the drier seemed to be to use the blower and blow hay into an adjacent barn for storage or feeding.

Barn curing tests were made on baled Alyce clover hay. An automatic one-man baler was used and set to bale as loose bales as possible and still allow some handling without breaking up of the bales. Hay of two different moisture contents was tried on the barn drier using heated air at a rate of about 20 CFM per sq. ft. of floor area. Slatted floor type of drier was used.

Hay that had a moisture content of 42 per cent when baled molded during the barn curing process. This was particularly true at the spots where the bales touched each other. Two-inch air spaces were left on the sides and ends of each bale and the tiers staggered. Hay baled at 25 to 28 per cent moisture showed no mold during barn curing and resulted in a fine quality of hay. In both cases heated air was blown through the hay for approximately 75 to 85 hours, with the bales stacked five tiers high. Difficulty was experienced with the baler in baling the 42 per cent moisture hay.

—WILEY D. POOLE AND H. T. BARR.

The Use of Ozone for Processing Small Grains

Experiments were started during 1950 to obtain data on the effects of ozone on rough rice when applied during drying and storage. The value as a drying agent and effect on milling quality, germination, and rodent and insect control are each under study.

The first year's data reveal that ozone has very little or no effect on drying, little or no effect on germination, and some effect on the milling quality of rice. There was a slight increase in the milling quality of ozone-dried rice over ordinary air-dried rice. The increase ranged from 2.4 per cent to 4.86 per cent whole kernels, or an average increase of 3.67 per cent whole kernels for five tests on Rexoro rice. For four tests on Blue Rose rice, the increase ranged from 2.50 per cent to 5.02 per cent, or an average increase of 3.29 per cent whole kernels. The over-all average increase for the nine tests was 3.51 per cent whole kernels after milling. The rice used in each of these tests was dried to about 14 per cent moisture, wet basis.

Further investigations on other small grains, clovers, and grasses will be made during the next year, with some checks on the effect of ozone on molds, fungi, insects, and rodents.

—C. H. THOMAS AND H. T. BARR.

Rice Drying with Radio-Frequency Heat

This project is a joint undertaking of the Louisiana Experiment Station and the U. S. Department of Agriculture, Agricultural Engineering Research. A study of the effects of the radio-frequency electric field upon rough rice is being conducted to determine the worth of applied dielectric heating in the rice drying and storage processes.

Some advantage in drying rates is indicated by the work thus far; however, these results are not as yet conclusive, and economics of a practical application are yet to be investigated. Germination and milling quality of the dried rice appear to be influenced by temperature and drying rates in much the same way as the conventional warm air drying methods. Effects of the electric field upon mold spores and bacteria are also being studied.

—FINIS T. WRATTEN.

Dallis Grass and Clover Seed Drying

A laboratory study was made of different methods of drying Dallis grass and clover seed and the effect on germination. Also, a study was made on present harvesting and processing methods and troubles.

Air temperatures up to 130 degrees F. in a forced heated air drying system can be used for drying Dallis grass seed without injury to the seed. Preliminary results indicate that infrared and high frequency drying decreases germination slightly.

The methods used to harvest Dallis grass seed are: (1) Cut with a mower, allow to dry one or two days, then combine from the swath or windrow. Disadvantages are that with the high and

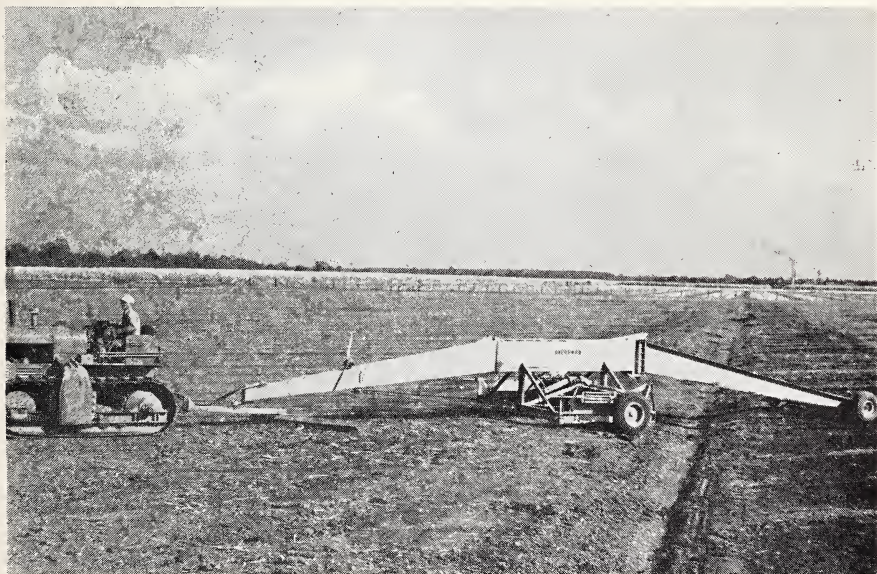
frequent rainfall in Louisiana, the farmer takes a great risk of losing all of his seed or obtaining poor quality seed; also shattering and high cost of harvesting. (2) Straight combining. Disadvantages are: the seed contain a high moisture content at harvest, particularly the first and second harvests, and in bulk will heat up in less than an hour. The seed have to be spread out on a floor or tarp to dry, and require stirring every two or three hours to prevent overheating until the seed are dry enough for storage.

Temperatures up to 150 degrees F. can be used to dry white clover seed with little detrimental effect on the germination. Samples of clover hay containing florets were run through a hammer mill after artificially drying, and the regular germination of these samples averaged considerably higher than the check samples which were sun dried. However, there was very little difference in the total germination.

—JOSEPH C. NEWELL.

Drainage for Sugar Cane Land

Research work on drainage for sugar land is being conducted jointly by the U.S.D.A. Soil Conservation Service Research and



Floating type land leveler used in developing grading techniques for sugar cane land.

the Louisiana Agricultural Experiment Station. This year concludes four years of data on the grading of land for sugar cane by turtle-backing.

One hundred and five acres have been under test on black land, light land and sandy land. Sugar cane varieties grown were C.P.

Nos. 34-120, 29-120, 36-105, and 36-13. The average increase of cane per acre on these test areas for the four years has been 5.81 standard tons of cane.

The importance of precision grading is again evidenced in the yield data for 1950. For three years there has been an average of 5.5 standard tons per acre increase from areas with no pondage over that with 52 per cent ponded two inches and over.

In order to get more precision in grading of sugar cane land, we experimented with the use of a floating type land leveler this past season, supplementing the land leveler with some scraper work. Techniques have been developed where a precision job of grading can be accomplished with 4½ hours of equipment operation per acre.

Work was continued with a specially equipped wheel-type trencher for cutting lateral sugar cane ditches. Tests this past season showed the following on new ditches: on heavy soil the machine cut 7.7 feet per minute and on lighter soils 10 feet per minute. This is a new ditch 36 inches deep, 52 inches wide at the top, and 20 inches wide at the bottom.

—IRWIN L. SAVESON.

Research in Building Materials from Farm Residues

The studies during the past year on farm residues for building materials were confined to bagasse, sawdust, and rice hulls. Sugar cane bagasse received most attention. Structural boards, specimens ¾ inch and ¼ inch thick, were made using thermosetting resins in various proportions with bagasse, sawdust, and shavings. Tensile strengths ranged from 430 to 3,725 P.S.I., with flexural strength following the same trend but ranging 65 per cent higher than the tensile strength. The nail holding ability was comparatively high for lateral movement of nails but low for direct withdrawal. Panels containing less than 15 per cent resin were unable to withstand the "Forest Products Laboratory" accelerated aging test.

The different panels show promise for such purposes as interior panelling, cabinet making, furniture manufacturing, and other uses that do not require excessive loads.

—JOHN S. NORTON.

Animal Industry

Breeding a Meat Type Hog for Louisiana

In a changing economy competition from vegetable fats has reduced the price of lard until it is not economically feasible to produce more than the minimum amount necessary for the health of the animal and to make the lean cuts attractive. This is particularly true in Louisiana where a mild winter and warm summer climate further reduces the desire and necessity for fat in the human diet.

In 1949 two "meat type" hogs, a boar and a bred sow, developed by the Bureau of Animal Industry at Beltsville, Maryland, were obtained. These animals were derived from a Danish Landrace-English Large Black cross and now breed true. They are $\frac{3}{4}$ Landrace- $\frac{1}{4}$ Large Black. Maintained as purebreds at this station, they make rapid gains and produce a desirable carcass but have not been very prolific. These animals are being maintained and selection for greater fecundity practiced.

The Beltsville boar was bred to a Hampshire-Poland China-Duroc sow, to produce a litter in March, 1950. Of 10 pigs farrowed, 8 were raised to maturity. At 56 days this litter weighed 390 pounds, or an average of 48.7 pounds per pig. Seven selected purebred litters had an average 56-day litter weight of 35.6 pounds per pig. The mating was repeated and in September a litter of 9 pigs was farrowed and raised. This 56-day weight was 344 pounds, or an average of 38.2 pounds per pig.

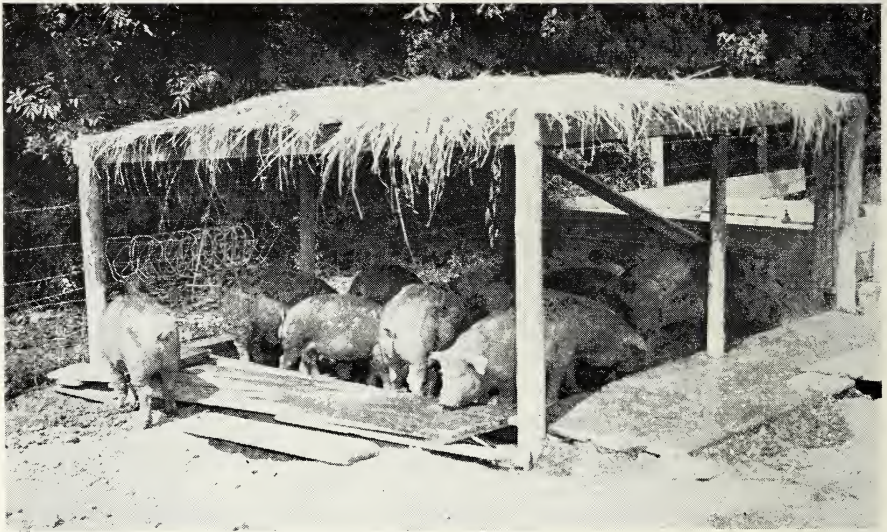
Four of the best gilts and the best boar were saved from the first litter. The boar was bred to his sisters to farrow in March, 1951. The best gilts are being retained from the fall litter. From this nucleus an attempt will be made to develop a meat type hog adapted to Louisiana. —J. F. KIDWELL AND C. B. SINGLETARY.

The Value of Shelters and Wallows in Fattening Swine in Summer

The two trials conducted during the summers of 1948 and 1949 proved that providing sanitary wallows as a cooling system for fattening hogs in summer lowered the body temperatures and increased the rate of gain and economy of feed utilization. The unsanitary mud wallows produced definite detrimental effects on the health of the pigs. Serious skin eruptions were prevalent among all the pigs in the mud wallow lot.

In 1950 a similar trial was run with one exception. A wet

shade type shelter was substituted for the mud wallow lot. This type of cooling system was produced by installing fine mist-producing nozzles attached to a water pipe suspended from the ceiling of a temporary shelter with a straw covered roof that was set up



A practical wet shade shelter (fine mist spray) beneficial for hogs fattened during the summer months.

over a well-drained concrete floor. The following results were noted:

1. The average body temperature of the pigs provided with a wet shade type shelter was two degrees lower than that of the pigs in the dry lot (no wallow).

2. Hogs having access to the wet shade shelter (fine mist spray) made greater gains and more economical gains than those in the sanitary wallow lot and the dry lot.

3. Hogs without artificial cooling facilities had an extremely high respiration rate as compared to those with the wallow and fine spray system.

4. Hogs not provided with some method of cooling lie in the shade during the day and feed at night. Consequently very unsatisfactory gains are produced.

—C. B. SINGLETARY.

Improvement of Beef Cattle for the Southern Area

Thirteen southern states and the Bureau of Animal Industry, USDA, are cooperatively engaged in a project seeking to genetically improve beef cattle in the southern region by application of breeding practices. Work in Louisiana is aimed at discovering the maximum efficiency of crossbreeding with particular emphasis on the

optimum use of Brahman cattle. Breeding experiments with cattle are necessarily slow, and therefore no experimental results are available. However, considerable progress has been made in the acquisition of cattle and facilities. The project is presently being conducted at four locations in Louisiana.

The Iberia Livestock Experiment Farm at Jeanerette is co-operating with this station. A herd of purebred Brahmans as well as various Brahman-Angus crosses are maintained and compared. Promising bull calves are individually fed and future herd sires selected on the basis of rate and economy of gain. Steer calves from this herd are fed at Baton Rouge and tested for rate of gain and carcass quality.

At Baton Rouge a 300-acre pasture area has been divided into six 50-acre breeding and calving pastures. A herd of approximately 160 cows is allotted among six bulls, each of a different purebred or cross. These include Hereford, Angus, Shorthorn, Brahman, Charbray and Africander-Angus crossbreds. High grade or purebred lines of Hereford, Angus and Brahman and an inter se bred line of Africander-Angus are maintained for comparison. The 1951 breeding season will be the first year of complete operation of this project.

The North Louisiana Experiment Station at Calhoun maintains a small herd of Devon cattle and a small herd derived from an Africander-Angus cross. Last year reciprocal crosses were made and these calves will be available for study this year.

The North Louisiana Hill Farm Experiment Station at Homer has fenced an area of about 300 acres for beef cattle work. No definite breeding program has been formulated yet for this Station. However, this question will be decided and work initiated during the coming year.

—J. F. KIDWELL, C. B. SINGLETARY, S. E. McCRAINE,
T. M. DEROUEN, AND R. M. CROWN.

Alluvial Land Pastures

A comparative study of the grazing value of Dallis and carpet grasses was conducted on two 6-acre pastures of river bottom land at Baton Rouge during the spring and summer of 1950. Lot 1 had a 90 per cent stand of Dallis grass as compared to a solid stand of carpet grass in Lot 2. The details of this test are as follows:

Lot		Cattle	No. of Days Grazed	Gain per Head	Ave. Daily Gain per Head
1	Dallis grass.....	4	138	212 lbs.	1.54 lbs.
2	Carpet grass.....	4	138	183 lbs.	1.33 lbs.

A third 6-acre pasture in this river bottom plot which had been our highest producing clover pasture through 1946, was non-productive from a clover standpoint in 1947. No response was obtained from a top-dressing of phosphate and potash in 1948. The pasture was practically all carpet grass. In the fall of 1949 this plot was plowed and fertilized with 300 pounds of 4-12-8 per acre before



A third year stand of clover pasture on river bottom land produced without commercial fertilizer.

seeding to oats, alsike clover, Ladino clover and Red Top. An excellent stand of clover was evident in the spring of 1950, and 10 head of 600-pound steers made high gains from March 30 through June 28. The number of steers grazing was reduced to 6 head on this date, and the pasture continued to produce satisfactory gains until October 11. The information obtained from this project is as follows:

Total gain per acre.....	385 lbs.
Animal days per acre.....	260
Average daily gain per head.....	1.48 lbs.

It is evident that a top-dressing of fertilizer on old sod is not economical. The heavy type soils of the river bottoms should be completely broken and reseeded every fourth year to produce the maximum benefits.

—C. B. SINGLETARY AND S. E. MCCRAINE.

Sweet Sudan Grass as a Supplementary Pasture for Beef Cattle

A six-acre check pasture that had produced very low gains on beef cattle for the past three years was broken and seeded to 30 pounds of sweet Sudan on May 1, 1950. No fertilizer treatment was used on this plot, and the cost of seed was \$3.08 per acre.

In spite of an unusually dry season from June through Sep-

tember this pasture produced a large yield of forage that was very palatable to the livestock.



Sweet Sudan produces a heavy yield of palatable forage during dry summer months.

An average of six yearling steers grazed from June 12, 1950, to August 1, and again from September 7 through October 11, 1950.

Complete results of this trial are as follows:

Average number of cattle.....	6.00
Number of days grazed.....	84.00
Average initial weight.....	503.00 pounds
Average final weight.....	699.00 pounds
Average gain per head.....	196.00 pounds
Average daily gain.....	2.33 pounds
Cost of establishing pasture.....	\$10.00 per acre
Net profit.....	\$36.84 per acre

—C. B. SINGLETARY AND S. E. MCCRAINE.

Crossbreeding Swine

A continuous three-way crossbreeding program was initiated by the late Dr. C. I. Bray and has been in effect for ten years. The three breeds are Hampshire, Poland China and Duroc. An example of the first cycle of the cross follows:

Poland China Boar	Hampshire Boar	Duroc Boar	Poland China Boar
Duroc Sow	Crossbred Sows 50% Poland 50% Duroc	Crossbred Sows 50% Hampshire 25% Poland 25% Duroc	Crossbred Sows 62½% Duroc 25% Hampshire 12½% Poland

Thus only the crossbred sows are saved for breeding. A purebred boar is used each time. In this way hybrid vigor is utilized twice. First, the crossbred sows themselves exhibit hybrid vigor in bearing larger litters, giving more milk, and "mothering" the pigs to better advantage. Secondly, the crossbred pigs they bear are larger, stronger, more vigorous and tend to grow faster.

A continuous three-way cross would appear to show possibilities of greater profit in commercial pork production if prudent judgment is exercised.

A comparison of the records of our three-way crossbreds and our best purebred Durocs from 1945 through 1950 follows:

	Ave. No. Farrowed	Ave. No. Raised	Ave. 56-Day Pig Weight	Ave. 56-Day Litter Weight
Crossbred Litters	9.7	8.9	39.4	351
Production Registry Purebred Litters	9.8	8.6	37.5	323

—J. F. KIDWELL AND C. B. SINGLETARY.

Selection and Improvement of Duroc Swine

The Duroc herd of 12 sows made an excellent record for the fall farrowing season of 1950. Out of 12 litters farrowed 66.6 per cent qualified as Production Registry litters. This achievement is identical with the record made in 1947 when the Duroc herd was acclaimed the first production accredited herd of any breed. Ninety per cent of the pigs farrowed were raised to weaning age of eight weeks. This record can be attributed to sound management and selective breeding practices.



L.E.S. Demeter, 770636, P.R. 2501****, a 4-star production sow. Typical of the high producing sows maintained in the Duroc herd.

A certificate of special merit was received from the Duroc Association for the herd improvement record made in 1950.

—C. B. SINGLETARY.

Crops and Soils

Fertilizers for Sugar Cane

The areas selected in 1950 for the study of the effect of various mixtures of fertilizer on the growth of sugar cane were principally those where responses to phosphorus and potassium had not been obtained in previous studies. These soils were primarily the heavier, more fertile ones.

The response to nitrogen was the outstanding feature in all of these tests. Even where yields as high as 30 to 40 tons were obtained without fertilizer, there was still a response to 60 pounds of nitrogen. In cases such as on a Sharkey clay where yields were very low there was an even greater increase in yield due to the addition of 60 pounds of nitrogen per acre.

Eighty pounds of nitrogen were used with good effects on Commerce silty clay loam on the Mississippi River.

Levels as high as 100 pounds of nitrogen with 40 pounds of phosphate and 60 pounds of potassium were used to good effect on Mhoon clay loam at Little Texas plantation.

Where second stubble cane was grown on an intermediate textured soil, an Iberia silt loam at Katy plantation, the addition of phosphorus and potassium resulted in a 3.5-ton increase in yield above that obtained from 80 pounds of nitrogen alone. Cane grown on this soil responded favorably to the application of more than 60 pounds of nitrogen.

Minor elements did not affect the yield of cane on a heavy organic soil at Lockport. Dolomite lime was of no value, and while yields were high, there was no response to any form of fertilization.

Two source of nitrogen tests were conducted in 1950. One was on Iberia silt loam at Franklin, the other on Mhoon clay loam at Napoleonville. So far as this and previous tests have shown, there appears to be little difference in the yield of sugar cane due to the source of nitrogen. Price and availability, so far as is now known, are the most important factors to be considered in selecting the nitrogen material to be used.

—JACK D. DEMENT AND M. B. STURGIS.

The Effect of Split Applications of Nitrogen as Anhydrous Ammonia on the Yield of Sugar Cane

The value of split applications of nitrogen was tested at four locations on pleistocene terrace and old alluvial soils of the sugar

cane area. Stubble cane was used in all experiments. Applications of nitrogen were at the 60 and 100 pound levels. The treatments applied at each location included: half of the nitrogen as ammonium nitrate applied in the early spring, followed by the remainder as anhydrous ammonia at layby; half of the nitrogen as ammonium nitrate and the remainder as anhydrous ammonia in early spring; all of the nitrogen as ammonium nitrate in the early spring. Forty pounds of phosphate (P_2O_5) and 60 pounds of potash (K_2O) were included in some of the treatments at both the 60 and 100 pound per acre levels of nitrogen. Where phosphorus and potassium were used they were applied in the early spring.

The highest yielding treatment on a Lintonia silt loam at Youngsville was 100-40-60 with half of the nitrogen applied at layby. This practice yielded slightly more than a four-ton increase over the yield obtained from a 100-40-60 mixture applied early in the spring. The addition of phosphorus and potassium resulted in increased yields, especially at the 100 pound level of nitrogen.

The results of the experiment on Baldwin silt loam indicated strongly that where as much as 100 pounds of nitrogen were applied, there was a more efficient use of the nitrogen from split applications. Where 100 pounds of nitrogen were used, good results were obtained from the use of 40 pounds of phosphate (P_2O_5) and 60 pounds of potassium (K_2O).

Responses to phosphorus and potassium where high levels of nitrogen were applied were especially noticeable in the data from Iberia silty clay loam at St. Martinville. Increases of as much as 19 tons of cane per acre were obtained where phosphorus and potassium were applied with 100 pounds of nitrogen, as compared to a 14-ton increase obtained from 100 pounds of nitrogen alone. Split application of nitrogen was the highest yielding treatment in the test, but splitting the application did not increase the yield of cane statistically over the conventional method of application.

The highest yielding treatment on Iberia silty clay loam at Orange Grove plantation again was from the 100-40-60 mixture in a split application. The increase over the 100-40-60 applied early was very small. There was no statistically significant response to phosphorus and potassium, and the responses to nitrogen were not so pronounced as in the previous studies.

The results of one year's study, while not conclusive, do show that where as much as 100 pounds of nitrogen are used on light and medium textured soils, a split application may be of value. When amounts as small as 60 pounds of nitrogen were used, there was little or no response to splitting the application.

These tests also indicate very clearly that where as much as 80-100 pounds of nitrogen are used on light and medium textured soils, phosphorus and potassium should be applied for best results.

—JACK D. DEMENT AND M. B. STURGIS.

Cotton Investigations

Trials of commercial cotton varieties, advanced strains, and new strains were conducted in 1940 on five Louisiana Experiment Station farms. These tests were located at Bossier City, Calhoun, Homer, St. Joseph, and Baton Rouge, Louisiana. Detailed reports of each of these tests at these five locations are available and may be obtained by requesting the information from either one of the stations mentioned above.

In a summary of acre yield of lint at three locations—Red River



Three new strains shown in the picture above from the Baton Rouge test in 1950 show the response to selection in a comparative yield trial. The middle row (Deltapine 231-1) produced 1,167 pounds of lint per acre, the left row (D x S-7-39-2) produced 1,001 pounds, and the right row (Stoneville 62-3163) produced 546 pounds. The check variety in the same test produced 816 pounds of lint per acre.

Valley Experiment Station, Bossier City; Northeast Louisiana Experiment Station, St. Joseph; and Louisiana Agricultural Experi-

ment Station, Baton Rouge—it was noted that the relative performance of all varieties at any one station was not the same as at the other two stations. On the other hand, Deltapine 15, Fox and Plains (CSS9) were the most consistent high yielding varieties at these three stations.

A large number of new strains were tested in 1950. In many cases, some of the new strains produced very high acre yield of lint. These high yielding strains appear to offer an excellent opportunity for cotton improvement.

—F. W. SELF AND JACK E. JONES.

Outfield Experiments on Cotton, Corn and Oats

Cotton—The projects on the fertilization of cotton included experiments using commercial grades now recommended for cotton fertilization, experiments on the sodium-potassium relationship in the nutrition of cotton, studies of the effects of calcium and magnesium in the growth of cotton, and studies of the effects of lime, sulphur, and minor elements on cotton.

Increases in yield of seed cotton have been obtained on Almont very fine sandy loam at Oak Ridge, Louisiana, from the application of 600 pounds of 8-8-8 per acre plus 600 pounds of dolomitic lime. At this location the plots receiving no fertilizer produced 806 pounds of seed cotton per acre. From the application of 600 pounds of 8-8-8 the yield was increased 436 pounds. When 600 pounds of 8-8-8 per acre were applied plus 600 pounds of dolomitic lime, the yield was raised to 1,304 pounds per acre. The dolomitic lime was applied before the complete mixture.

Results from an experiment conducted on Lintonia silt loam at Winnsboro, Louisiana, indicate there is a definite deficiency of P_2O_5 and K_2O at this location. It has been the general practice in the area where this experiment was established to apply nitrogen alone in the fertilization of cotton. As a result of this experiment and three years work prior to this, it has been found that complete mixtures of 6-8-8 or 8-8-8, at the rate of 600 pounds per acre, have given the highest yields. Further increases in yields have also been obtained from applying dolomitic lime at the rate of 600 pounds per acre in addition to the complete mixtures.

Experiments for studying the role of sodium as a nutrient element in the growth of cotton, particularly the ability of sodium to substitute for potassium, have been conducted for four years on six different soil types at eleven locations. On soils deficient in potassium, nitrate of soda gave higher yields than ammonium nitrate when applied alone or in combination with phosphate. In nine out of the eleven experiments, nitrate of soda in combination with phosphate and potash gave higher yields than ammonium nitrate. In 1950 the addition of sodium to complete mixtures containing ammo-

nium nitrate, superphosphate, and muriate of potash did not increase the yield of cotton significantly.

The results of the study in 1949 on the effects of lime, sulphur, and minor elements on cotton, conducted at the North Louisiana Hill Farm Experiment Station on Norfolk loamy sand, show that liming with the application of sulphur, borax, and copper sulfate in the 8-8-8 mixture produced the highest yield of seed cotton. At this location 422 pounds of seed cotton per acre were obtained from the application of 600 pounds of 8-8-8. When 600 pounds of 8-8-8 plus 1,000 pounds of dolomitic lime, 320 pounds of sulphur, 5 pounds of borax, and 5 pounds of copper sulfate per acre were applied, the yield was increased 866 pounds per acre. The average yield of seed cotton per acre obtained from this treatment was 1,288 pounds. The data obtained in 1950 from the second-year study show no response from any of the minor elements applied.

Corn—Field experiments on corn were conducted in cooperation with individual growers under ordinary farm conditions. Four different soil types were selected in establishing these experiments. The nitrogen was applied at the rates of 48, 72, and 96 pounds per acre. The nitrogen was applied as side-dressing, and with complete mixtures of 5-10-10 applied before planting.

The highest yield obtained in 1950 was 96.7 bushels from the application of 300 pounds of 5-10-10 per acre, plus 81 pounds of nitrogen as side-dressing to corn on Olivier silt loam at Opelousas. Nitrogen applications profitably increased the yield in all experiments; however, in all the tests the highest yields resulted where phosphate and potash were also added. In two experiments, one on Olivier silt loam at Opelousas and the other on Olivier silt loam at Winnsboro, there were significant responses to phosphate and potash. Only in one other experiment conducted several years ago was a response to potash reported in corn fertilization in this state.

Oats—A five-year study has been made on the fertilizer recommendations for four soil types in this state. The results of these experiments have shown that high yields of oats have been obtained on alluvial soils by applying 48 to 64 pounds of nitrogen as top-dressing. On soils of the coastal plains, coastal prairies, Mississippi terrace and on the lighter alluvial soils, the best yields have been obtained from the application of 300 pounds of an 8-8-8, 6-8-8, or 5-10-10 mixture per acre, plus 32 pounds of nitrogen.

—JAMES GREGG MARSHALL.

The Soil Testing Laboratory

During 1950 the laboratory received and analyzed 6,400 samples of soil. This was an increase of about 50 per cent over the number received the previous year. The laboratory will be able to handle

a greater number of samples in 1951 because of addition of some new equipment and changes in methods of analyzing samples. These changes and additions will enable the laboratory to get the results and recommendations to the farmer more quickly and help meet the demand for soil testing.

Experiments are being continued in the Red and Mississippi River bottom soils to determine the response of winter legumes to applications of phosphorus and potassium in these alluvial soils and to correlate this response with the analysis of soils. Two tests were conducted in Avoyelles Parish near Moreauville in the 1949-50 season on Yahola very fine sandy loam soil. Good growths of legumes were obtained in these tests, but there was no response from the use of phosphorus or potassium. The soil in these tests contained 150 p.p.m. of available phosphorus and 66 and 96 p.p.m. of available potassium.

On a Yahola very fine sandy loam soil at Alexandria, good response was obtained from the application of phosphorus, but none was obtained from the use of potassium. The soil contained 100 p.p.m. of available phosphorus in the surface soil and 50 p.p.m. in the subsoil. The available potassium was 81 and 77 p.p.m. in the surface and subsoil, respectively.

On a Mhoon silty clay loam soil at Batchelor in Pointe Coupee Parish, good response was obtained from the use of phosphorus on pasture clovers, but no response was obtained from the use of potassium. The soil contained 50 p.p.m. of available phosphorus, which is low for this soil type. The available potassium was 125 p.p.m., which was sufficient for this soil type.

—W. J. PEEVY, R. H. BRUPBACHER,
C. W. McMICHAEL, AND H. O. MUERY.

Microorganisms Involved in Nitrogen Transformations in Soils

The study of microorganisms isolated on nitrogen-free media from soils of the Louisiana rice area has been continued. Tests concluded this year showed that none of the organisms fixed nitrogen in association with the roots of rice seedlings in semi-solid nutrient solution in the laboratory, although some prolonged the life of the seedlings.

The numbers of fungi, bacteria, and algae have been estimated in the soil in immediate contact with the roots of growing rice plants, in the same flooded soil a few feet away from the plants, and in the same soil nearby, but not flooded. Fungi were present in largest numbers in the non-flooded soil; however there were about 200,000 per gram of soil in contact with the rice roots. Most of the fungi were of the genera *Penicillium*, *Fusarium*, and *Aspergillus*. The largest number of bacteria capable of growing on a nitrogen-free medium was found in the flooded soil where plant roots were

not present. Practically all of these were of the genus *Clostridium*. *Azotobacter* were not found at any of the three locations. The presence of the rice roots and flooding had no effect on the numbers of algae. The algae present were largely Chlorophyceae; these are not considered important in nitrogen fixation.

Studies are in progress to determine whether the fungi isolated from the soil in contact with the rice roots are capable of utilizing atmospheric nitrogen in soil when supplied with an abundant source of energy. Initial results indicate that small amounts of such nitrogen may be used by some of the fungi.

—W. H. WILLIS AND JOE E. SEDBERRY.

Responses of Cotton, Soybeans, and Lespedeza to Minor Elements on Ruston Loamy Fine Sand and Memphis Silt Loam

The limited availability of certain minor elements has been shown to be increasingly important in recent years in the production of larger yields of many crops. In comparison with some of the southeastern states, Louisiana has done very little toward determining these needs. This work is being done to further determine the need for additions of minor elements to Louisiana soils.

Greenhouse experiments were conducted with Ruston loamy fine sand using cotton and soybeans as indicator plants and with Memphis silt loam using lespedeza as an indicator plant to determine responses of these plants to additions of fertilizer, lime, sulphur, zinc, copper, boron, manganese, and other elements. Two-gallon stoneware pots were used, each containing 14.8 pounds of air-dry soil which had passed a one-quarter inch screen. The fertilizers, lime, and other materials used were made from chemically pure reagents and mixed with all of the soil in each pot. The amount was calculated on the acre basis, using 2,000,000 pounds of soil per acre. At the end of the growth period the plants were harvested and the dry weights determined. Three replicates of each treatment were made, and an analysis of variance was determined on the data.

Cotton on Ruston loamy fine sand showed a significant increase in growth from the use of 5 pounds of borax added with an 8-8-8 fertilizer and dolomitic lime. A significant response was also shown from the addition of 400 pounds of magnesium sulphate when the source of lime was calcium carbonate. Higher yields were obtained from the use of sulphur when lime was also added, but a following crop was depressed and the soil was made strongly acid. The benefits from boron and magnesium showed up in the second crop.

Soybeans on Ruston loamy fine sand were less responsive to the use of fertilizer and lime than was cotton. Esminel added with

3-12-12 fertilizer and lime gave a highly significant increase in yield over the check. The use of boron or sulphur together with fertilizer and lime gave an increase in yield over the check that was significant at the 5 per cent level.

Lespedeza on Memphis silt loam showed a highly significant increase in yield from the use of Esminel added with a 3-12-12 fertilizer. Esminel is a commercial mixture of minerals containing 7.81 per cent CuO , 18.41 per cent MnO , 4.46 per cent ZnO , 2.85 per cent Fe_2O_3 and 0.54 per cent B_2O_3 . The addition of zinc, copper, boron, molybdenum, iron, and manganese gave a significant increase in yield at the 5 per cent level over fertilizer alone. This increase is due to the addition of manganese to the mixture, since these other elements added together without manganese did not give any increase in yield.

—CHARLES W. McMICHAEL.

A Soil Survey Study of the Soils of St. Mary Parish

Land owners and operators are continually searching for more information on how to improve their crops, increase their crop yields, and profitably utilize all their acres. As the knowledge of soils, crops, and fertilizer uses has increased at a rapid pace during the past 30 years, so have farming practices, crop varieties, and fertilizer uses changed.

A soil survey is now in progress in St. Mary Parish for the purpose of collecting needed, exact physical and chemical information on the soils of this parish. This information may be used for determining the most profitable agricultural uses of the land. It may be incorporated in the recommendations to farmers so that each acre of land may be profitably utilized. This soils information includes the color, texture, and depth of the soils, the areas needing drainage, the land slope, the crop adaptability and crop yields, and other important, observable soil features. Two surveyors are now in the field mapping soils; 113,000 acres of the parish have been surveyed to date.

St. Mary Parish has an area of 605 square miles and is one of the coastal parishes of southern Louisiana. It is one of the largest sugar cane producing parishes of the state. The land area is nearly level, except the gently sloping area along Bayou Teche. Most of the land area of St. Mary Parish, excluding the marshes and swamps, is represented by soils somewhat older than the recent Mississippi River bottom land soils on the east of the Atchafalaya River. This is evidenced in more pronounced development in the layers or horizons that make up the soil profiles. Profile development is not so evident in the more recent Mississippi River bottom land soils. Most of the cultivated soils of St. Mary Parish represent natural levee deposits of older distributaries of the Mississippi or Red Rivers, built

up during the time they followed the course now occupied by Bayou Teche.

In cooperation with the soil survey of St. Mary Parish, C. E. Scarsbrook is conducting experimental studies on the structure and permeability of some of the heavy soils.

A study of the soil minerals of the different soil series is being conducted by B. N. Driskell. This study is to determine the characteristics and origin of the soil materials which make up the profiles. Total analyses of the constituents are also being made. These data are to be used in the correlation of the soil series.

When the soil survey and studies are completed, all information obtained will be published in a report of the United States Department of Agriculture, Bureau of Plant Industry. This report will include a complete, detailed soil map of St. Mary Parish, chemical analyses of the soils, and farm management and fertilizer recommendations.

—S. A. LYTLE, B. F. GRAFTON, AND A. RITCHIE.

Some Chemical and X-Ray Soil Profile Characteristics of the Baldwin, Iberia, and Buxin Series in Relation to Field Classification

There is much interest in the classification of the soils of the lower Mississippi flood plain. Occurring within the same field, side by side, there may be several soil series. The farmers find it difficult to change their fertilization and cultural practices with all of these soil changes. This investigation has been confined to the soils of St. Mary Parish in an attempt to better define and correlate the soil series chemically and mineralogically. In short, the purpose of the investigation has been to determine whether there is any justification for making series separations as shown by field characteristic differences, or whether some of these separations can be combined.

A chemical analysis of the soil constituents in the profiles of Baldwin, Iberia, and Buxin silty clay loams has indicated that these soils are chemically different. The oxides of iron, titanium, and manganese of the Buxin series, in general, occurred in greater amounts than in Iberia. These oxides were lower in all horizons of the Baldwin than in either Buxin or Iberia. The Iberia was highest in calcium oxide, Buxin was highest in magnesium oxide, and the Baldwin was highest in the oxides of potassium and sodium. This indicates that these series are derived from different materials.

Base exchange studies also indicate a difference between these soils. Exchangeable calcium was highest in the Iberia, magnesium highest in the Buxin, and potassium highest in the Baldwin. The base saturation and pH were highest in the Iberia and lowest in the Baldwin. The order of the characteristics also indicates that the

series have originated from different materials or are in different stages of profile development.

The X-ray patterns of the clay fraction of various horizons of the Baldwin, Iberia, and Buxin silty clay loams show the predominating minerals to be quartz and montmorillonite. Small quantities of kaolinite, hydrous-mica and chlorite are detectable.

—B. N. DRISKELL.

Experiments with New Species, Varieties and Strains of Forage Crops

Red Clover—Soil and climatic conditions greatly influence the growth of red clover. Much greater forage yields were obtained on all varieties and strains of red clover in 1950 as compared to the yields of 1949. The same plots were used in 1950, but were better drained during the latter year. Kenland and Louisiana experimental strains 79 and 714 were outstanding for forage and hay production. Ohio van atta was low in forage production when clipped at intervals during the season to simulate grazing, but produced a better hay and seed crop than the other varieties and strains. Other entries included were: Louisiana red clover, Cumberland, Midland, Wisconsin mildew resistant, and Louisiana strains 717 and 795. There were no appreciable differences between locally adapted strains and varieties introduced from other areas for forage and seed production.

Grass for Winter Grazing—The search for better adapted species, varieties, and strains of grass for winter grazing has been continued. Among those tested during 1950 were rye grass and certain strains of tall fescue. Rye grass was the most productive of forage. The principal weakness of this grass is its susceptibility to rusts which lower the quality of the forage produced. Also it is an annual which does not reseed in this area; consequently it has to be planted each year. Of the strains of tall fescue, a new strain from Kentucky known as Glasgow appeared to be better adapted than either Kentucky 31 or alta. Other species included were chewings fescue and creeping fescue. Neither of these is suitable for pastures in this area. At present it appears that the lack of an adapted winter grass is one of the principal problems for consideration in making plans for year-round pasture. All strains of tall fescue appear to be susceptible to forage diseases which may become serious as this species is more widespread over the state.

Grass for Summer Grazing—Eight different species and strains of summer grasses were harvested six times for forage yields during 1950. These grasses were planted in the spring of 1949, but yields were not taken during that year. From the results of forage harvests in 1950, rhodes grass and Dallis grass (new strain B230) were superior to other entries. Other varieties and strains included were

bahia grass, carpet grass, giant blue panicum, K.R. bluestem, and Dallis grass (strain 430 and strain A). Dallis grass seems to be the only entry in this test that is able to withstand a light freeze and continue to grow. A good stand has not been obtained with giant blue panicum or K.R. bluestem.

Crimson Clover—Nine strains of reseeding crimson clover and common crimson clover were harvested twice for forage yields. A hay and seed harvest was made on all entries. From the results of the forage harvests, Watson and Talladego were superior to other entries. Others included were Allen, Thorsby, Dixie, Hardy, Thornton, Common, Autauga, and Auburn.

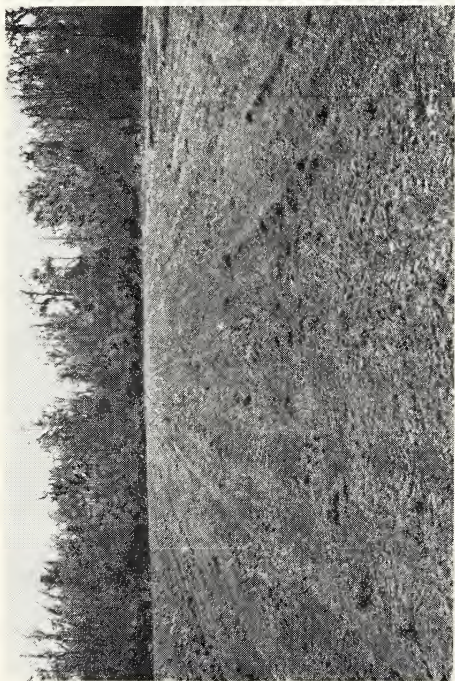
There were significant differences among the varieties and strains for seed production. Autauga produced an outstanding yield of seed but was low in forage. Watson, while producing excellent forage, was below the average for seed production. Autauga produced 355 pounds of seed per acre, while Watson produced only 134 pounds. The seed was threshed with a nursery thresher, and sampled. The samples were later germinated. There was no difference apparent for germination per cent between any of the strains. Observations are being made on the plots for reseeding during the current season. It has been recognized for some time that the principal criterion for measuring the reseeding ability of crimson clover is field observation following a successful crop.

—C. L. MONDART, JR., AND C. R. OWEN.

New Varieties of White Clover for Louisiana

Breeding work for the improvement of Louisiana white clover for pasture has been continued. During 1950 the first experiments were conducted for comparing the forage yield of recently developed varieties with that of other known strains of white clover. The results indicate that the two new synthetic varieties that have been formed are better forage producers than either Louisiana white clover or Ladino. As would be expected, there was also a difference between these new varieties in forage production. The variety designated as Synthetic 1 produced 24 per cent more forage than Louisiana white "Dutch," the parent variety. The total green weight of forage produced by Ladino did not differ significantly from that produced by Louisiana white "Dutch." These results are for only one season.

A synthetic variety is defined as a variety produced by the combination of selected lines or plants, after which it is allowed to inter-pollinate normally. The term is especially applied to normally cross-fertilized crops. The synthetic varieties of white clover were formed by crossing a number of superior clonal lines which originally were selected from native Louisiana stocks of white clover. A clonal line is the vegetative increase from a single plant selection.



Seed increase block of Louisiana Synthetic variety of white clover which was seeded November 15, 1949, in rows at the rate of less than one pound of seed per acre. Top, left, photographed January, 1950; top, right, same block in following April; lower, the same block in January, 1951.

Tests conducted during 1947, 1948, and 1949 with the clonal lines, which were used to form the synthetic varieties, showed clearly that they were superior to the parent strain. From these tests it was possible to predict fairly well the performance of the variety resulting from the combination. An effort is now being made to increase the seed of Synthetic 1 in such quantities as to be available to farmers as foundation seed for commercial seed production. About 150 pounds of seed were produced at Baton Rouge during 1950. This seed has been planted on the farms of five of the Branch Experiment Stations. The total acreage planted amounts to about 40 acres.

Further experimental work will be necessary to fully evaluate these varieties. During the current season Synthetic 1 will be planted by experiment stations in each of the southern states in a uniform test with other white clover varieties. No grazing trials have been conducted with these varieties. Naturally the value of forage crops can be definitely determined only in terms of animal production. It is hoped this will be possible very soon.

Breeding work is being continued with this species in an effort to make further improvements. A space-planted nursery was transplanted last spring. From this material selections were made during the adverse weather last fall. An effort is being made to develop varieties with more heat resistance than is present in Synthetic 1. This variety exhibits considerably more ability to remain alive during the summer months than the parent variety. Further improvement for this important character is considered desirable and entirely possible.

—C. R. OWEN.

New Strains of Dallis Grass to Be Released

Two new strains of Dallis grass which have been developed during the improvement program are ready to be released to farmers for seed production. These strains originated through selection from native grass. Their performance has been superior to other native material for the production of better quality seed and more forage. The performance tests were conducted over a period of five years at Baton Rouge. The quantity of seed on hand for distribution is limited. There will be enough of both strains to plant approximately 150 acres.

Breeding work with Dallis grass is being continued. Plant selection with subsequent progeny testing is under way within certain new strains. The objective is for further improvement in seed quality. Plants were selected for vegetative vigor from three-year-old sod in the spring of 1949. The plants were removed and clonal portions of each were transplanted into separate rows. Seed was harvested from each row during the late summer, threshed, cleaned, and analyzed. Rows producing superior seed were planted in space-planted progeny tests the following spring. Seed was harvested

from these progenies and analyzed for pure seed content. Seed from each progeny are now being germinated to determine the viability of the pure seed.

In the breeding work which has led to the development of the superior strains, the source of the material was fields of native grass. The value of native grass as a source of material for use in improvement programs is recognized. However, it is considered worth while to explore other sources; hence, the experiments with selecting within improved strains. Obviously it is too early to predict the outcome from the experiments under way at this time. The results will no doubt be of help in determining the course to follow in planning the program in the future.

Experiments have been under way during the past two seasons to determine the per cent of florets of Dallis grass which develop seed in the absence of infection from ergot. Clones from five plants each of ten lines were transplanted into the greenhouse in November. They were grown under artificial light during the winter and early spring. The first seed harvest was made February 16 and a second June 3. Counts were made of the total florets on each head and the per cent of florets forming caryopses determined. A wide range existed between the lines for the per cent of florets forming seed. Certain of the lines formed seed in 43 per cent of the florets in February, while others produced seed in only 18 per cent during the same period. The average for the group in February was 27.4 per cent. Seed heads harvested in June were lower in fertility than those harvested in February for all lines. The range in per cent caryopses filled for June was from 5.3 to 26.8. The average per cent florets forming seed for June was 21.4. As was the case the previous year, significant variation existed among the lines for seed set per 100 florets. Most lines were consistent for this factor at both harvest dates. This would indicate further that significant variation for fertility is present within the species. Field experiments with progenies of individual plants selected within strains, which originated from a single plant selection, will give additional information regarding the inherent stability of the individual plants.—C. R. OWEN.

Dairy Research

Effect of Calcium on Reproduction and Milk Production in Dairy Cows

This phase of nutritional studies with dairy animals was started in 1947. Four grade Jersey cows and 6 grade Jersey heifers were fed a limited amount (6 pounds) of low quality (low Ca, low P) native grass hay along with a simple grain ration containing 3 parts of yellow corn meal, 1 part cottonseed meal, and 1 per cent salt. This ration was fed at a 10 per cent higher level than recommended by Morrison's standards. Shark liver oil supplied vitamin A, since the animals had no access to pasture. They were bred by artificial insemination. It took three to six services for conception for all animals on this basal ration which resulted in 50 per cent abortions for 1947 and 66 per cent in 1948. All animals were free of Bang's disease. Heifers having first calves and which did not abort, had calves born dead or very weak. This ration also produced some stiffness in walking, and in some cases, humped back, bent hind leg, swollen leg joints, depression at the base of the tail, and constant tongue licking. The blood picture for plasma Ca, plasma inorganic P, and hemoglobin was normal. In 1949 Ca (oyster shell flour) was supplemented daily to all animals. Only one to two services per conception were required resulting in normal births. The administration of Ca also increased milk production as much as 50 per cent in some cases and maintained this high production until advanced lactation. This year Ca has been fed to milking animals every other month, resulting in an increase in 4 per cent fat corrected milk (F.C.M.) yield for most animals when Ca was fed and a decrease in 4 per cent F.C.M. when Ca was not given.

—L. L. RUSOFF.

Crossbred Jersey-Red Sindhi vs. Jersey and Holstein Cattle

Red Sindhi X Jersey crossbred yearlings were compared with purebred Jerseys and Holsteins of the same age as to their reactions to summer weather on the University farm at Baton Rouge. The study was conducted for eight days when air temperatures and relative humidity taken at 2:00 P.M. averaged 89.8° F. and 47.4 per cent, respectively. Body temperatures were recorded and pasture performance was noted on two days.

Results showed the average body temperature of the crossbreds to be significantly lower than that of the Holsteins but not lower

than that of the Jerseys. The Jerseys averaged slightly lower, 0.21° F., than the crossbreds. The crossbred animals were not as sensitive to the direct rays of the sun as were the Holsteins and Jerseys, for they would often lie in the sunshine when the others sought the shade. The Red Sindhi X Jersey animals grazed more than the Jerseys and Holsteins during the daytime but less at night. However, statistical analysis did not reveal any significant difference between the grazing time of the crossbreds and the grazing time of either of the other two breeds. This study is being continued in order to obtain more conclusive data.

—G. D. MILLER, J. B. FRYE, JR., B. J. BURCH, JR.,
AND PAUL HENDERSON.

Effect of Cooling Cows by Sprinkling on Grazing Performance and Milk Production

Experimental work with cooling dairy cows by sprinkling consistently shows that cows will graze more during the summer months when they have the benefit of a shower. The increased grazing occurs only during the daytime, as the cows without the shower tend to recover the lost grazing time of the daylight hours when allowed to graze at night. During the summer of 1950 (June, July, and August), cows using the shower grazed an average of 31 minutes more per 24 hours than a similar group without the shower.

Sprinkling has been more effective for the Holsteins than for the Jerseys in increasing grazing. The effect on milk yield has not been significant for Jerseys, but the sprinkled Holsteins in 1950 averaged 3.5 pounds more per day than those not sprinkled. Since many factors are uncontrollable under field conditions it can not be said definitely just how much of this increase was due to cooling by sprinkling.

—G. D. MILLER, J. B. FRYE, JR., B. J. BURCH, JR.,
AND PAUL HENDERSON.

The Effect of a Vitamin B₁₂ Supplement in a Calf Starter for Calves Weaned from Milk at an Early Age

A 19.4 per cent digestible protein calf starter containing additional thiamine, riboflavin, calcium pantothenate, and niacin, but no animal protein, was compared with a similar ration plus a vitamin B₁₂ supplement (A.P.F.) so that the ration contained 10 mg. of vitamin B₁₂ per ton. The vitamin B₁₂ had no effect on Jersey and Holstein calves weaned from whole milk at 28 days of age when gains in weight, height at withers, and feed efficiency were compared at 90 days of age. The average daily gain for the Holstein calves on the basal ration was 1.09 pounds and on the A.P.F. supplemented ration 1.10 pounds; for the Jerseys the values were 0.79

pound and 0.78 pound, respectively. The decrease in growth rate which sometimes occurs after weaning calves from milk at an early age was not prevented by the addition of a vitamin B₁₂ supplement.

—L. L. RUSOFF AND M. O. HAQ.

Antibiotic Feed Supplement (Aureomycin) for Calves

A 2 per cent level of aureomycin supplement (2.5 mg. of aureomycin per gram) in a simple all-plant protein basal ration increased the growth of Jersey calves, 3½ months of age, by approximately 35 per cent over the control group for the first 6 weeks of the experiment, after which the rate of growth gradually declined. The aureomycin group showed an improved appearance throughout the experimental period.

In this research two groups of 5 Jersey calves each, 14 weeks of age were used. The control group received a basal ration consisting of 1 part cottonseed meal, 3 parts yellow corn meal, 2 per cent bonemeal and 1 per cent salt without aureomycin. The aureomycin group was fed the basal ration containing 2 per cent aureomycin supplement. The animals were allowed some pasture and some medium grade lespedeza hay. The average daily gain per calf after 6 weeks was 1.43 pounds for the aureomycin group and 1.09 pounds for the control group. After 20 weeks the average daily gains were similar for both groups, being 1.66 and 1.65 pounds, respectively.

—L. L. RUSOFF.

Control of Oxidized Flavor Development in Stored Frozen Cream

The utilization of sweet cream in the manufacture of ice cream is by far the most profitable way of disposing of surplus milk. In Louisiana the production of surplus milk is mostly seasonal and local, and since practically all surplus is produced in city milksheds, the disposal of this milk presents an important economic problem both to producer and manufacturer. The converting of surplus milk into fluid cream (40 to 50 per cent fat) to be stored in the frozen state for future use by the ice cream industry is both practical and profitable. Frozen cream, however, often develops characteristic off-flavors which in most cases are attributed to fat oxidation.

Experiments to control oxidation of fat in stored frozen cream using certain relatively new antioxidants are being conducted. Results of preliminary trials with butylated hydroxyanisol (Tenox, BHA) have been favorable. Pasteurized cream of average quality to which copper was added to induce oxidation was treated with butylated hydroxyanisol and stored at -10° F. for 6 months. Trials with nordihydroguaiaretic acid and other antioxidants are now in progress.

—A. J. GELPI, JR. AND L. L. RUSOFF.

Streptomycin and Penicillin Increase the Fertility of Bull Semen

Twenty-nine split ejaculates from eight bulls relatively low in fertility were shipped to 36 technicians who were divided into two equal groups. The semen treatments, which were alternated between the two groups, were as follows: (1) Egg yolk-citrate-sulfanilamide (300 mg. per 100 ml.) and (2) egg yolk-citrate-streptomycin-penicillin (1,000 units of streptomycin and of penicillin per ml.).

Table 1 is a summary of the fertility data on the eight bulls.

TABLE 1. Effect of Streptomycin-Penicillin and Sulfanilamide on Fertility of the Semen of Relatively Infertile Bulls

Bulls	Treatment 1		Treatment 2		Change in Fertility
	Number Services	Per Cent 60-90 Day Non>Returns	Number Services	Per Cent 60-90 Day Non>Returns	
J103.....	55	47.3	52	75.0	+27.7
J107.....	97	57.3	82	76.8	+19.5
J114.....	43	44.2	39	56.4	+12.2
H201.....	40	47.5	40	67.5	+20.0
H202.....	27	48.1	17	58.8	+10.7
G304.....	48	66.7	38	63.2	- 3.5
G305.....	51	54.9	49	73.5	+18.6
G312.....	73	54.8	49	71.4	+16.6
TOTALS.....	434	53.6	366	69.9	+16.3

As is shown in Table 1, based on 60-90 day non-returns to 800 first services the fertility level of the semen treated with 300 mg. of sulfanilamide per 100 ml. of extended semen was 53.6 per cent and that which was treated with 1,000 units each of penicillin (Crystalline penicillin G) and streptomycin sulfate per ml. of extended semen was 69.9 per cent. Not only was this difference highly significant statistically under experimental conditions, but it demonstrates the practical importance of adding streptomycin and penicillin to the semen of relatively infertile bulls.

Since the completion of this study streptomycin and penicillin have been added routinely to the semen of all bulls used in artificial breeding at the Dairy Improvement Center. It is a matter of record that this has aided materially in giving the highest levels of fertility since the initiation of the artificial breeding program in Louisiana. Further studies along this line are in progress.

—CECIL BRANTON, T. E. PATRICK, DENIS E. SIMON, JR.,
AND M. H. NEWSOM.

Different Sites of Semen Deposition in the Cow Compared

A study involving 2,014 first services, four sites of semen deposit,

10 experienced technicians, and 34 dairy bulls was made to determine the effect of different sites of semen deposit upon breeding efficiency of dairy cattle. The sites of deposit were as follows:

- A. Two-thirds of the semen deposited in the body of the uterus and one-third in the second or third fold of the cervix.
 - B. Semen deposited in the second or third fold of the cervix.
 - C. Semen deposited in the body of the uterus.
 - D. One-half of the semen deposited in each horn of the uterus.
- A summary of the fertility data is shown in Table 1.

TABLE 1. Fertility Data for Different Sites of Semen Deposition

Site of Deposit	Total First Services	Per Cent 60-90 Day Non>Returns
A.....	503	62.4
B.....	500	58.4
C.....	500	64.8
D.....	511	62.6
TOTALS.....	2,014	....

The differences between treatments (sites of deposit) were not significant when tested statistically.

—C. W. KNIGHT, T. E. PATRICK, H. W. ANDERSON,
AND CECIL BRANTON.

Entomology

Sugar Cane Insects

The most vigorous campaign ever waged against the sugar cane borer suppressed perhaps the heaviest infestation of this insect in history. A catastrophe due to borer destruction may have been averted through this extensive control program.

Sugar Cane Borer Infestation in 1950 Potentially Great—The carry-over of overwintering borers from the heavy infestation of 1949 was the largest in recent years. Population studies in fields of all representative areas of the cane belt revealed that there was an average of 2,737 live borers per acre in these fields in January and February. As many as 15,000 per acre were found in fields of summer-planted cane. Large numbers overwintered not only in cane pieces, stubbles, and summer-planted cane but also in shoots growing from early cut cane and early fall-planted. In a normal fall, borer egg deposition ceases before fall-planted cane produces sufficient growth to attract moths. The first generation in the spring of 1950 was the heaviest and most widespread observed in the last decade. It was even heavier than was anticipated from the extremely large population successfully surviving the second mild winter in succession.

State Assistance Program for Borer Control—The borer situation was so acute in early spring that the Louisiana Legislature appropriated \$250,000 to aid sugar cane growers in purchasing insecticides for fighting the pest. The Louisiana Department of Agriculture and Immigration, the Louisiana Agricultural Experiment Station, the Louisiana Agricultural Extension Division, and the U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, cooperated in administering the extensive chemical control program. Approximately 62,300 acres of cane were treated for first generation control under the State-assistance program. Adding to this the acreage which the farmers dusted on their own for control of the first and second generation gives a total of about 68,000 acres treated at a cost of more than a half million dollars. The chemical control program together with the general application of various cultural control practices was very successful in reducing the borer population to a relatively low level in the whole cane area. On farms where growers continued the program and dusted the acreage needing second generation treatment very little damage was evident at harvesttime. The annual survey of borer losses revealed that

12.87 per cent of the joints were bored as compared to 22.00 per cent in 1949, a very significant reduction in damage.

Insecticidal Studies—In 1950, our efforts were concentrated on studies involving the comparative effectiveness of cryolite and Ryania, the two insecticides recommended for control of the borer. Undiluted cryolite and 40 per cent Ryania were compared in seven different tests against the second generation. The results were comparable to those of previous years in that Ryania proved to be somewhat superior to cryolite against this generation, exhibiting a lasting effect which aided in preventing damage from later generations.

In one test in the West Baton Rouge area cryolite and Ryania were compared against the second generation, the second and third, and the third generation alone. Although control of the second generation with cryolite and Ryania resulted in increased yields of 4.82 and 5.26 tons, respectively, increases of 2.48 and 2.37 tons resulted from control of the third generation. Various tests have shown that gains from third generation control are governed to a large extent by the degree of second generation injury already inflicted and the conditions of cane growth at the time. A heavy application of Ryania on both second and third generations at the rate of about 20 pounds per acre per application reduced the borer infestation to 10 per cent of the joints bored as compared to 58 per cent in the untreated checks. The yield of cane was increased by 8.39 tons per acre. This demonstrated the possibilities of obtaining a higher degree of control through heavier applications.

In another test it was found that reduced concentrations of Ryania of 15 and 7.5 per cent with n-propyl isome and with piperonyl cyclonene as activators were not as effective as 40 per cent Ryania without the activators.

Since many growers had alternated or used applications of cryolite and Ryania in various combinations, a test was conducted on fall generations of borers in summer-planted cane to study the possible effect of such a procedure on degree of control. The results showed that there were no significant differences in control from straight applications of each of the two materials and different combinations of the two.

In airplane and ground machine tests, cryolite spray compared favorably with cryolite dust for borer control. There appears to be no particular advantage in spraying instead of dusting.

—A. L. DUGAS, E. J. CONCIENNE, AND C. E. SMITH.

Chlordane as a Soil Treatment Continues to Offer Promise for Control of the Sweet Potato Weevil

Three seasons of experimentation using chlordane as a soil treatment previous to planting have shown that this insecticide

offers excellent promise as a practical and economical method of controlling the sweet potato weevil in the field. Experiments in 1948 and 1949 were conducted by applying the chlordane mixed with old sawdust in the row just previous to setting the slips. In the 1950 tests the chlordane was pre-mixed with the fertilizer, thus eliminating one field operation by applying the two at the same time. The chemical was used at 2, 5, and 10 pounds of technical material per acre. Seventeen per cent of the potatoes in the untreated plots were infested as compared to three per cent in the treated plots at harvest. There was little difference in infestation among the three dosages tested, the lightest dosage being almost as effective as the heaviest dosage used. Calcium arsenate dust applied eight times during the season reduced the infestation approximately the same as the soil treatments with chlordane.

To date no undesirable off-flavor has been found in potatoes produced on chlordane treated soil. Also no plant injury has been observed in any of the experiments where this chemical has been used.

Since this method of sweet potato weevil control shows promise and is both economical and practical, the studies should be continued in an effort to develop a supplementary method of weevil control in the field.

—E. H. FLOYD AND C. E. SMITH.

Insecticide Tests for Control of Cotton Pests During 1950

A study of 3-5-40 dust, 3-5 spray, toxaphene dust, toxaphene spray, special calcium arsenate plus one per cent gamma BHC, special calcium arsenate plus two per cent gamma BHC, aldrin spray and dieldrin spray showed these materials to be equally effective for control of the boll weevil when used at recommended dosage rates. Aldrin and dieldrin, like BHC, failed to control bollworms without the addition of DDT. The special calcium arsenate plus one per cent and two per cent gamma BHC failed to give adequate control of bollworms. Damaging infestations of spider mites developed following applications of 3-5, aldrin, and dieldrin sprays.

Calcium arsenate spray, and mixtures of BHC and DDT applied as a dust, as a spray from dry wettable concentrates, and as a spray from emulsifiable concentrates were studied. The sprays were applied with a ground machine at the recommended dosage rates in 8 to 9 gallons of finished spray per acre per application. The dust was applied with a ground machine at approximately 12 pounds per acre per application. All materials gave about equal control of the boll weevil but the calcium arsenate spray failed to control the bollworm.

Results of insecticide tests during 1950 brought out the following points:

1. There is a wide choice of insecticides which will give satis-

factory control of the major cotton pests when applied properly.

2. DDT is superior to the other available insecticides for boll-worm control.
3. Sprays and dusts are equally effective for the control of cotton pests when used at the same rate.
4. A material which will control spider mites should be included in mixtures of the newer synthetic organic insecticides.
5. Proper timing of the initial application, maintaining the correct interval between applications, and thoroughness of application of insecticide are essential for effective control of cotton pests. —J. S. ROUSSEL, L. D. NEWSOM, C. E. SMITH,
W. W. DRY, D. M. JOHNS, AND C. R. JORDAN.

The Tobacco Thrips as a Pest of Seedling Cotton

A study of the tobacco thrips as a pest of cotton during the last three seasons shows that injury to the seedling plant by this pest results in a reduction in height and in amount of leaf area, produces excessive branching of the main stem, and causes a slight delay in maturity of a part of the crop. This injury is usually outgrown as the season advances so that there is little difference in either vegetative growth or yield of seed cotton by the end of the season.

In addition to the direct effects of thrips injury to seedling cotton it has also been observed that plants damaged by thrips are more severely injured by the disease known as "damping-off" or "soreshin." Leaf area may be reduced as much as 80 per cent when seedling cotton plants are attacked by thrips. This reduction in leaf area suggests that photosynthetic activity and translocation of elaborated food are probably greatly reduced, resulting in a weakened plant much more susceptible to attack by the organism causing "damping-off" or "soreshin."

The tobacco thrips appears on cotton planted about the middle of April as soon as the seedling plants emerge from the soil. A peak in population is reached about the middle of May, and the insects practically disappear from cotton one month later.

A study of migration of the tobacco thrips shows that it starts in early March, reaches a peak during the last week in April and the first three weeks of May (when they have been trapped at the rate of as many as one million thrips per acre per day), and gradually decreases during the remainder of the year.

Important winter and early spring host plants of the tobacco thrips include white clover, crimson clover, bur clover, alfalfa, Persian clover, hop clover, and oats. Late spring and summer host plants include lespedeza, peanuts, Johnson grass, sprangletop, and *Brachiararia* sp. The vetches, winter peas, and roughpea seem to be of little importance as host plants.

These studies indicate that there is no advantage in thrips control from the standpoint of total yield produced. A majority of the tests have shown a slight decrease in total yield as a result of controlling this pest. However, the more normal, uniform and rapid growth of seedling cotton resulting from thrips control allows for more rapid and efficient cultivation of the crop when the plants are small. The efficiency gained in cultivation may make thrips control a profitable practice especially on highly mechanized farms.

In order to obtain maximum benefits from control of this pest the first application of insecticide must be made as soon as the plants come up to a stand. This should be followed by a second application 7 to 10 days later.

—L. D. NEWSOM, J. S. ROUSSEL, E. C. BURNS,
W. W. DRY, AND C. E. SMITH.

The Effect of Infestation by a Spider Mite on Growth and Yield of Cotton

Heavy infestation of cotton by a spider mite in plots where all other pests were controlled reduced the yield of seed cotton by 45 per cent. The size of infested plants was reduced 26 per cent, as measured by dry weight, and the leaf area of infested plants was reduced by 36 per cent.

This infestation also produced adverse effects on seed and fiber characteristics. It caused a reduction in length of fiber, increased the percentage of immature fibers, decreased the weight of seed and lint, and caused a reduction in seed germination.

—J. S. ROUSSEL, J. C. WEBER, L. D. NEWSOM, AND C. E. SMITH.

DDT Dust Effective in Control of Corn Earworm in Sweet Corn

Experiments in 1948 and 1949 in which a mineral oil-DDT spray was used (See Annual Report, 1948-49, La. Agric. Exp. Station) showed that excellent control of the corn earworm was possible. However, during the 1950 sweet-corn season the same materials caused severe stalk and ear damage. This was apparently due to different climatic conditions existing during the 1950 season from those of the previous seasons. As a result it was considered advisable not to continue further the studies with an oil type spray for sweet corn.

Previous tests using DDT dust had not proved successful; however, these dust applications were not begun until the silks had matured. In the 1950 dust experiment the plots were dusted with 10 per cent DDT beginning when approximately 20 per cent of the silks were showing, and continuing at 2-day intervals for 4 and 6 applications.

Plots receiving 4 applications contained an average of 41 per cent of the ears entirely free of earworm damage, and plots which received 6 applications contained an average of 48 per cent of the ears entirely free of earworm damage. Untreated plots contained only 1 per cent of the ears free of damage. There was no sign of plant or ear injury from the use of the DDT dust. Ears were normal with the grains being filled to the tips.

—E. H. FLOYD AND C. E. SMITH.

Control of Soil Insects Affecting Corn in Louisiana

A study of the soil insects affecting corn has been in progress since about 1940. Experiments at several points over the state have shown that excellent control of the sand wireworm is possible with dosages as low as 2 ounces of the gamma isomer of benzene hexachloride per acre applied in the row at planting time or broadcast over the field in the fall or spring. Chlordane applied at the rate of 2 pounds technical material per acre is also highly effective against this wireworm.

Tests in 1950 included the study of the residual action of these chemicals in the soil, as well as the possibilities of using them as seed treatments to replace their use as soil treatments. Plots treated in 1947, 1948, and 1949 with benzene hexachloride and chlordane still gave complete protection from wireworm damage to the 1950 corn crop. Seed treatment experiments using chlordane also gave excellent results in 1950. Plots left untreated yielded approximately 40 per cent less corn than plots where the seed were treated with chlordane or the chlordane was pre-mixed with the fertilizer. Since benzene hexachloride imparts objectionable odors and tastes to certain crops following its application to the soil, the use of this material to control soil insects is not recommended except on land devoted solely to cotton or field corn production. Chlordane, on the other hand, has not been found to possess this objectionable characteristic.

Because of the unusual, mild temperature of the winter of 1949-50, the seed-corn maggot and the Southern corn rootworm emerged from the soil several weeks before the planting season, thus largely eliminating these insects as enemies of seedling corn in the spring of 1950. No insect control data were obtained in any of the several experiments conducted in South Louisiana during 1950. However, since damage by these insects was naturally eliminated, it was possible to study the effects of the chemicals on the germination and development of the corn seedlings. It was found that both chlordane and benzene hexachloride delayed the germination and early development of the softer corns when used in excess as a seed treatment. When used at lower dosages the damage was practically eliminated. No detrimental effect could be observed

when they were applied as a soil treatment in the row even at abnormally high dosages.

Lindane, the pure gamma isomer of benzene hexachloride, was also used as a seed treatment for corn for the control of the seed-corn maggot and the rootworm. No detrimental effect on germination or development of the seedlings could be observed from the use of this material.

Further studies concerning the use of these chemicals as seed treatments, especially Lindane, is warranted, since this method of soil insect control is far more economical and practical than any other method studied to date. —E. H. FLOYD AND C. E. SMITH.

Control of Onion Thrips with DDT

An experiment was conducted in 1950 on the control of thrips infesting onions, comparing DDT as an emulsion spray with a 5 per cent DDT dust. A total of seven applications of each treatment was made at weekly intervals. A 0.5 per cent DDT emulsion spray was used at the rate of 12 gallons per acre per application. This dosage was equivalent to one quart of 25 per cent DDT emulsion concentrate per acre per application. The spray was applied at both weekly and two-week intervals. Dust applications were made weekly at the rate of 10 pounds per acre per application.

Detailed thrips counts throughout the season showed that the DDT spray applied at weekly intervals kept the number of thrips per plant down to less than one. The same spray applied at two-week intervals averaged approximately three thrips per plant; whereas the dust treated plots contained an average of over eight thrips per plant. Untreated plots contained an average of 22 thrips per plant.

Unfortunately this field of onions was attacked by mildew which seriously affected the yield. The yields of uncured mature onions were as follows: DDT dust, 2,761 pounds per acre; DDT emulsion spray at weekly intervals, 2,969 pounds per acre; same spray at two-week intervals, 2,927 pounds per acre; and untreated, 2,413 pounds per acre.

Results of this experiment definitely show the superiority of DDT spray over DDT dust for thrips control on onions. The spray when applied at two-week intervals gave sufficient residual toxicity to adequately protect the plants from a build-up of the insects.

A combination spray using a fungicide with the insecticide should be studied in order to combat or prevent mildew of onions at the same time the thrips are being controlled.

—E. H. FLOYD AND C. E. SMITH.

Fertilizer and Feedstuffs Laboratory

Activities of Laboratory

The past year has again seen an increase in the activities of the laboratory. Official samples analyzed for the State Department of Agriculture increased to 4,070. Particular emphasis has been given to analysis of cotton insecticides, such as the 3-5-40 mixture. These analyses were run as a check on manufacturers of feedstuffs, fertilizers and economic poisons. While the check analysis of the cotton poisons have in general been satisfactory, it is suspected that some of them are not in suitable physical condition and it is planned to make the tests by physical methods on insecticides in the coming year. As a result of this checking, the quality of these commodities is maintained and farmers may buy with confidence.

Though the primary function of the laboratory is to make analyses as above, 400 samples were analyzed last year for other departments of the Experiment Station and for people of the state. These analyses were concerned with such materials as silage, mixed feeds, fertilizers, insecticides, herbicides, limestone, range forage, water, etc.

Various laboratory personnel carried on projects directed toward improving the analytical methods in cooperation with the Association of Official Chemists. A new and shorter method for the determination of available phosphoric acid in fertilizer was developed and published in "Analytical Chemistry."

Race Horse Analysis for "Dope" Detection—Through the kindness of the New York Racing Commission and Mr. Charles Morgan of their laboratory, services of Mr. Harry Peterson were made available to the Louisiana Agricultural Experiment Station to assist in setting up a laboratory for the detection of drugs from specimens obtained from race horses. Work for the Louisiana Racing Commission was begun on Thanksgiving Day, 1949.

During the year 1950, 918 samples were analyzed, with two positives being found. The laboratory analyzes twelve samples a day, results being reported the same day samples are received.

Saliva samples and as many urine samples as possible are taken from the winning horses each day. All urine samples are analyzed and usually three to five saliva samples per day. The analyses are made by the same procedure as followed by the New York Racing Commission, with purification by the Stass-Otto process and identification of drugs by micro-crystalline and color tests. A Beckman UV spectrophotometer is used for confirmatory test.—E. A. EPPS.

Forestry

Thinning Methods in Stands of Planted Slash Pine

Further results are available from the slash pine thinning study at Bogalusa. The heavy crown and selection methods were applied in 1938 when the plantation was 13 years old, and the light crown and low plots were first thinned in 1939. The check plots have never been thinned. All measurements are as of ten years after thinning, at age 23 or 24. Variations in effects brought about by the treatments are summarized as follows:

TABLE 1. Stand Structure and Productivity of Planted Slash Pine Ten Years After Thinning by Various Methods

Thinning Method	Trees Per Acre	Basal Area Production (per acre)	Average Diameter	Average Total Height	Crown- Height Ratio	Volume Production (per acre)	Sawlog trees (per acre)
	<i>No.</i>	<i>Sq. Ft.</i>	<i>Inches</i>	<i>Feet</i>	<i>Per cent</i>	<i>Cords</i>	<i>Number</i>
Unthinned.....	562	156	7.2	56	28	46	18
Heavy Crown.....	270	148	8.5	60	34	40	52
Light Crown.....	410	159	7.8	59	30	45	36
Selection.....	282	151	7.9	55	38	38	34
Light Low.....	466	167	7.5	59	26	47	22

Perhaps the chief fact revealed by these data is that even at this early age (about 24 years), each treatment has brought about a stand structure characteristic of the method. For example, light low thinning has resulted in moderate diameter increase, high cordwood volume, and relatively few trees of sawlog size (9.6 inches and up). Heavy crown thinning has concentrated growth on fewer trees, many of which are already big enough to produce sawlogs. No thinning at all has resulted in relatively small trees with short crowns, but there are many of them and in basal area and cordwood production they nearly equal the best of the thinned plots.

Practical aspect of these findings is that each forest owner should apply the method or modification best suited to his economic needs. A pulpwood company could probably produce the most wood over a short period of time by practicing low, light crown, or perhaps no thinning at all. Sawtimber operators, seeking to grow the largest and highest quality timber in the shortest possible time, should use heavy crown thinnings. A farmer, depending on availability of markets, might have a wide variety of choices. Assuming he is able to market most any product, integrated production of

posts, pulpwood, poles, piling, and sawtimber in approximately that order could readily be attained by a conservative low or light crown thinning program applied every five years. Or, if the farmer wanted to cut and use sawtimber on his own place, he could adopt the selection thinning system which has the added advantage of encouraging growth of grass for cattle grazing in the openings left after large trees are cut. In all thinning methods poorer and slower growing trees are removed so that there is a rapid rise in volume and value as the stand approaches maturity. —A. B. CROW.

Development of Timber Volume Tables for Use with Aerial Photographs

The first phase of investigating volume correlations with measurable factors on aerial photographs was to determine the relation, or association, of tree stem diameter (breast high) with visible crown diameter.

One-half acre square plots have been established in 45 southern pine sawlog-size stands of varying age, density, and composition. On these plots measurements of crown diameter, stem diameter, Girard form class, merchantable length, and total height have been made on each tree with a crown diameter of 4 feet or larger. Of the 45 plots, 38 were in stands of loblolly pine, either in pure stands or with mixtures of shortleaf, spruce, slash, or longleaf pines, and miscellaneous hardwoods. All of the stands sampled were second growth and ranged in age from 30 to 70 years.

In analyzing results a strong linear relation has been found between crown diameter and stem diameter. The correlation coefficient (r_{yx}) between stem diameter and crown diameter was calculated as 0.98, or nearly perfect positive correlation. A linear regression coefficient (b_{yx}) of 0.55 was computed and the following linear regression equation was derived:

stem diameter (inches) = $4.78 + 0.55$ crown diameter (feet)

The high degree of correlation between stem and crown diameters appears to lend much promise to the possible determination of gross volumes of trees through aerial photographic interpretation. Preliminary volume tables have been prepared, but will require further analysis and ground checking before publication.

For rapid approximation of tree diameter from crown diameters as measured on aerial photographs the following rule of thumb is suggested: "the stem diameter (inches) is equal to five plus one-half the crown diameter in feet." This rule has been shown to give satisfactory results in sawlog-size southern pine stands (excluding longleaf pine), regardless of stand age or density.

—CHARLES O. MINOR.

Home Economics

Nutritional Status of Pre-Adolescent Boys and Girls in Selected Areas of Louisiana

This study is the fourth in a series planned to determine the nutritional status of Louisiana people, and has been expanded to include the following: (1) to evaluate means of assessing nutritional status and (2) to determine the weekly variation of hemoglobin levels, plasma ascorbic acid, vitamin A, and carotene within subjects.

The actual collection of data was begun on February 1, 1950. The subjects have been selected from white elementary public school children ranging in age from 7 years 5 months to 11 years 6 months. As of November 15, 1950, 156 boys and 161 girls, or a total of 317 children, have been examined. The locations of these subjects with number from each school included are: Highland Elementary School, 65, and Woodlawn Elementary, 53, of East Baton Rouge Parish; Crescent, 71, and Plaquemine Elementary, 27, of Iberville Parish; and Covington Grammar School, 101, of St. Tammany Parish. The representation of each group has been approximately the same. Examinations of another 100 subjects from Gentilly Terrace School, New Orleans, were started on November 27.

The procedures used and results tabulated to date are as follows:

Biochemical Measurements—Blood samples were collected by finger tip puncture. Replicate determinations were made on each subject after a seven-day interval to determine the variation within subjects. All collections were made on Wednesday forenoon between 9 and 11:30. Analyses were made for hemoglobin, plasma ascorbic, vitamin A and carotene by microchemical determinations. The results to date are shown in Table 1. The variability between two determinations of each of the values (Table 1) for 300 subjects has been tabulated for study.

Physical Measurements—Height was recorded to the nearest tenth of a centimeter. The Iowa Child Welfare Research Station measuring scale was used. Weights were taken in the morning, after removal of all clothing except weighing garment, not sooner than one hour after breakfast. They were recorded in pounds and ounces. Fifty-three per cent of the children were of normal weight for height, with 37 per cent falling below the standards used. Only 10 per cent were found to be over weight.

Clinical Examinations—The subjects were examined by Dr. Grace Goldsmith and two of her associates from Tulane School of

TABLE 1. Average Hemoglobin Levels, Plasma Ascorbic Acid, Vitamin A and Carotene Values of 316 Elementary School Children

Schools	No. of Subjects	Blood Values			
		Hemoglobin gms/100	Ascorbic Acid mg/100 ml	Vitamin A mcg/100 ml	Carotene mcg/100 ml
EAST BATON ROUGE PARISH					
Highland.....	66	12.3	0.97	41.1	151.1
Woodlawn.....	52	12.1	0.65	34.6	140.4
IBERVILLE PARISH					
Crescent.....	71	13.4	1.29	40.2	124.4
Plaquemine.....	27	13.0	0.60	40.5	118.9
ST. TAMMANY PARISH					
Covington.....	100	13.0	0.48	38.9	105.9
TOTAL NUMBER.....	316				
Average for Group.....		12.8	0.80	39.1	128.1

Medicine. The indices used are those that have been set up by Dr. Goldsmith for use in assessing nutritional status.

A tabulation of results indicated there was wide variation, in the prevalence of signs and symptoms associated with vitamin deficiencies, among children in each school and between schools. Changes in the gum tissues, and papillae of the tongue were present in approximately one-third of the children. Abnormal conditions of the skin and eyes associated with a lack of vitamin A were noted in approximately 20 per cent of the subjects. Signs of a past history of rickets were quite prevalent. Poor posture was very much in evidence among the group. As high as 30 per cent of the children in one school were judged to have poor posture while in another only 7 per cent were so classified.

Dietary Records—Seven-day diet records were obtained for each subject during the week between the drawing of the replicate blood samples. For the 8-year-old group the mothers were visited by the research worker responsible for obtaining the dietary records. They were given instructions in the keeping of the records and determining quantities for all food eaten at home. The school lunch was recorded by the research worker.

The 9-, 10-, and 11-year-olds kept their own records after having been given specific instructions.

Two hundred of these seven-day records are tabulated ready for setting up for I.B.M. calculations. The others are being coded.

The reported data are preliminary; when completed they are to

be statistically analyzed. In view of the importance of the application of the findings of these studies to the health of Louisiana boys and girls efforts have been made to have them used. Reports of the results of the clinical and biochemical examinations were given in lay language to the school authorities, the health committees of the Parent-Teachers Association, and the local parish health officers and nurses following the examinations.

The dietary needs based on findings from the diet records and blood values were presented to Louisiana Public School teachers and Parish Agricultural Extension workers in attendance at the Louisiana Teachers Association for use in planning their nutrition work.

—DOROTHY S. MOSCHETTE, ECHO P. CHEELY,
AND LAUREAME C. MCBRIDE.

Nutrition Education Research

Tests designed to measure school children's understanding of nutrition have been developed for grades 1-4 and 4-8. Cooperation has been given by the State Department of Education in encouraging certain selected schools throughout the state to administer these tests in their schools. The scores of about 2,500 school children are at present being used to obtain tentative norms for the test and to obtain an estimation of the reliability of the test. The validity of the tests as a means of comparing Louisiana school children's understanding of nutrition has been insured through the method by which the tests were constructed. It is planned to make these tests available for schools throughout the state.

Tests to determine pupils' food attitudes have been constructed. Nicholson Elementary School in Baton Rouge has cooperated in a separate study designed to provide an estimate of the validity and reliability of these tests.

The Nutrition Understandings tests, the Attitude tests and Food Habit records have been administered to 1,180 school children in grades 2-8 in Iberville Parish as one step in evaluating the effectiveness of the comprehensive nutrition education program that has been developed in Iberville Parish under the leadership of Dr. L. P. Terrebonne, Superintendent, and S. L. Crownover, Supervisor. The personnel of the nutrition education research project have assumed as their major function the evaluation of this program rather than the development of the program. The data obtained through the extensive testing program conducted in Iberville Parish are at present being analyzed.

A separate study was conducted to determine the effectiveness of using the school lunch for nutrition education purposes. Crescent School in Iberville Parish was used as the experimental school. This school has endeavored to correlate the classroom experiences of

pupils with their school lunch program in a number of ways. Two other elementary schools in the state were selected for control purposes in this experiment. These schools were judged to be very good schools but were not making any systematic effort to integrate the classroom experiences of their pupils with the lunch program. The economic status of the parents of the children from the control schools was higher than the economic status of the pupils from the experimental school. It was found in this experiment that the children from the experimental school definitely performed better on nutrition understanding tests than did the pupils from the two control schools. There was also some evidence of superiority of the pupils in the experimental school in their food attitudes and food habits as measured by the tests used in the experiment.

A study undertaken of the food practices in a rural southeastern Louisiana community is near completion. The planning of this phase of the research has been done by Drs. Clara Tucker and Ray Loree. Seventy-four families were visited and the homemaker interviewed concerning the frequency of preparation of various classes of foods, the method of preparation, resources for preparation, income available for food, food preferences of members of the family, and the eating routine of members of the family. These data are at present being analyzed in order to identify the major nutritional problems of the community investigated. An attempt was made to obtain data that would enable the researchers to explore the nature of the problems that would be encountered in a community nutrition education program designed to improve food practices. The data obtained have not been completely analyzed. However a few of the generalizations that the data analyzed do support are:

1. Problems that would seem likely to be encountered in changing food practices differ from family to family to such an extent that an individual approach would seem more promising than any overall program approach.

2. Existing agencies that are concerned with improving food practices of families are reaching the families that least need improvement in their food practices more than they are reaching the families that most need improvement.

3. A lack of a feeling of need for improving food practices seems to be a major general problem that would be encountered in a community nutrition education program.

—RAY LOREE.

Horticultural Research

During the past year greater strides have been made in horticultural research in this state than in any previous year. Contributions have been made by the horticulturists at the various substations as well as those at the main station. The ornamental horticulture program has been organized and is now under way. The department is completely staffed for the first time since the beginning of World War II. The latest staff member to be added was Dr. Stewart L. Dallyn as plant physiologist.

Lima Bean Breeding and Yield Tests

Twenty-seven superior selections were made in 1950 in addition to the two superior selections of 1949, L 1-1-1 and L 39-11F. These selections will be further evaluated in 1951. Many of these selections show great promise. The L 39-11F is now being increased for release and has been named "Easysshell."

Variety Tests—Because of unfavorable weather only three harvests were made. Under these conditions the Carolina Sieva produced the highest yields. The L 39-11F did recover from adverse weather and produced beans until killed by frost, while other varieties produced very few beans. Owing to its rapid recovery and continuous fruiting ability, it is a very desirable bean for home as well as for commercial use.

TABLE 1. Yield Data from Three Pickings at Baton Rouge

Variety	Pounds of beans per acre
Carolina Sieva.....	838.7
Willow Leaf.....	696.6
L 39-11F.....	712.6
L 1-1-1.....	590.0

The yield data in Table 1 show that the Carolina Sieva gave the highest yield (the probable reason being that it is slightly earlier than the L 39-11F), followed by L 39-11F. The two Louisiana bred seedlings are better in table quality than the older varieties. The L 39-11F is definitely more resistant to foliage and pod diseases than the Carolina Sieva.

—JULIAN C. MILLER, RAYMON E. WEBB, AND JOHN C. NOONAN.

Sweet Corn Investigations

The sweet corn work for 1950 consisted of a field variety trial of 16 varieties, canning and freezing samples of each variety, and organoleptic testing of canned and frozen samples after seven months of storage.

The three top varieties in yield, freeness from ear worm damage, general appearance, and fresh qualities were Golden Security, Aristogold Bantam Evergreen, and Selection K.V.F. 47-10.

Taste tests on frozen samples cooked after thawing indicated that the four outstanding varieties were Golden Sweet, Huron, Golden Hybrid 1734, and Aristogold Bantam Evergreen. Selection K.V.F. 47-10 rated good but not superior. Taste tests on canned samples showed Golden Sweet, Golden Hybrid 1734, Selection K.V.F. 47-10, and Aristogold Bantam Evergreen rated excellent.

The best varieties for home and market use as shown above are Aristogold Bantam Evergreen and Selection K.V.F. 47-10. Golden Security produced well but rated only fair as cooked, canned, and frozen corn.

—P. L. HAWTHORNE, RITA BELLE ATTAYA, AND R. M. CROWN.

Pole Bean Variety Yield Tests

In the Annual Report of 1947-48 we announced two new varieties of pole beans, namely, the Canfreezer and Green Savage. Both

TABLE 2. Combined Data of Pole Bean Variety Yield Tests Conducted in 1948, 1949 and 1950 at Baton Rouge, Springfield, Hammond, and Lafayette (Yield Expressed in 30-Pound Bushels per Acre)

Variety	Baton Rouge		Springfield		Hammond	Lafayette*	
	Spring ¹	Fall ¹	Spring ²	Fall ³	Fall ³	Spring ³	Fall ³
Canfreezer.....	373.1	312.0	206.4	162.8	287.2	95.6	411.6
Green Savage.....	386.8	270.8	267.4	176.3	239.5	109.0	402.9
Kentucky Wonder...	308.7	118.3	152.4	137.9	227.1	82.3	214.7
Blue Lake.....	192.6	178.3	129.2	.....	.....	46.0	195.8
McCaslan.....	.....	.....	192.9	126.5	277.1	.....	.....
No. 6 x Ky. Wonder..	302.5	127.4	238.9	213.6	246.1	.....	.....

¹Three-year average

²Two-year average

³One-year average

*Spring season very dry, accounts for low yield

of these new stringless varieties are being received well throughout Louisiana and the rest of the South. Since their introduction, spring and fall yield tests comparing these two new selections with other standard varieties have been conducted. The yield data are given in Table 2.

These results show that Green Savage and Canfreezer, intro-

ductions of the Louisiana Agricultural Experiment Station, out-yielded all other varieties in the trials. The yield of Green Savage



Pole bean increase plot showing fruiting characteristics of the Canfreezer variety. This variety begins setting pods at the ground and continues fruiting throughout the height of the trellis. Photograph also shows the system of training commerical beans to a trellis. Seed are planted 12 to 14 inches apart in the row and bamboo poles are crossed and tied to a strand of barbed-wire. Posts supporting the barbed-wire are placed about 50 feet apart in the row. It has been found at the Louisiana Agricultural Experiment Station that this is a very satisfactory method of training pole beans.

excelled that of Canfreezer in the spring. However, Canfreezer is earlier, more rust resistant, and of better quality. The fall yields show Canfreezer to be superior to Green Savage.

—JAMES F. FONTENOT, JULIAN C. MILLER,
W. F. WILSON, JR., AND H. K. RILEY.

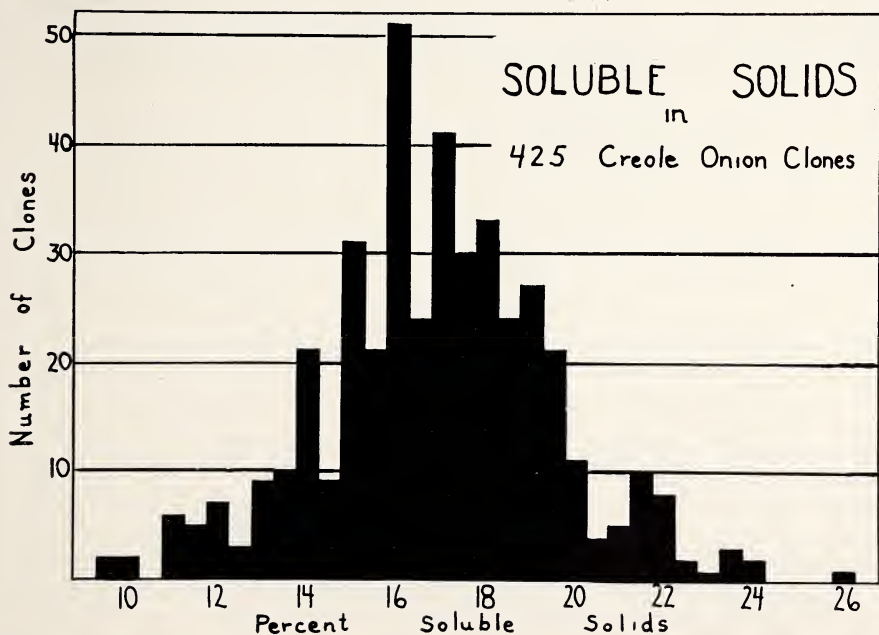
Onion Breeding to Improve the Creole Variety

The Creole onion breeding project in cooperation with the National Onion Improvement Program has been set up with eight objectives: (1) breeding for resistance to onion diseases, with special emphasis on the downy mildew disease which threatens to wipe out the onion and shallot industry in Louisiana; (2) breeding for higher soluble solids in order to still further improve the keeping qualities of the Creole onion; (3) development of hybrid onion seed

for higher yields and greater uniformity of the product; (4) breeding for resistance to thrips, the most serious onion insect pest; (5) a study of environmental factors affecting onions (including storage tests) to learn the causes of early bolting and splitting; (6) yield trials to select superior onion lines; (7) developing a program of improved onion seed in mildew-free areas; and (8) testing foreign introductions for their adaptability and disease resistance under Louisiana conditions.

The following genetic stocks are now being grown: 44 named domestic varieties, 85 foreign introductions, 6 thrips resistant lines, 9 yellow dwarf resistant lines, 15 inbred Creole lines, 201 male sterile lines for hybrid seed production, 8 lines of Creoles exposed to 200 to 1600 Roentgen units of X rays, and 67 *Allium* species.

The Creole onion, well known as a good keeper in storage, derives most of its good storage qualities from its high soluble solids content. By use of the refractometer and the dry weight methods, solids were determined in 425 clones of onions during the 1950 season. Each clone consisted of all the bulbs arising from the vegetative division of a single bulb. Soluble solids ranged from 9.8 to 26.0 per cent as shown in the graph below.



Seed increase is being made of those lines with soluble solids of 19.0 per cent or higher. Bulbs for seed increase were sent to the North Louisiana Experiment Station at Calhoun and the Sweet

Potato Farm at Chase. No mildew has ever been reported from either of these areas. Further seed increase in cooperation with commercial seed producers is being done in California.

In preparation for future improvement work a collection of garlic types has been assembled. Cytological studies are under way to learn the nature of sterility in garlic.

—AUGUST E. KEHR AND E. C. TIMS.

Chemically Controlled Peach Maturity

Work was initiated in 1950 to determine the effect of 2,4,5-T on rate of maturity of the peach. Five varieties, Golden Jubilee, Fire-glow, Sunhigh, July Elberta and Summer Crest, were used in the test. Three rates of application of 40 p.p.m. of 2,4,5-T were applied to each variety about 22 to 24 days before they normally matured. Additional applications were made to the Golden Jubilee variety at about 36, 29 and 15 days before normal maturity.

All treatments hastened maturity, but growth was so abnormal that the fruits were rough, cracked and of such uneven maturity that they were unfit for commercial packing. Total and soluble solids analyses of the fruits showed that as the amount of 2,4,5-T applied to the trees increased, the solids content of the peach fruits decreased.

—P. L. HAWTHORNE, J. C. TAYLOR, AND RITA BELLE ATTAYA.

Sweet Potato Investigations

The work on sweet potatoes for the past year includes that conducted at Baton Rouge, Chase, and seven other locations in the state. Since one of the primary purposes of the Louisiana Sweet Potato Farm at Chase, Louisiana, is to grow foundation stock seed, over 500 bushels of each reselected Unit I Porto Rico and L-241 were grown for distribution throughout Louisiana. Other promising seedlings were increased for further testing.

Breeding—Plants in the breeding nursery were evaluated as to their fertility level when used as parents. Certain lines, such as L-130, L-21 and L-240, are more fertile when used as female parents than L-241, L-201 and L-224. Preliminary studies suggest that the lack of fertility may be due to the styles being deficient in an unknown substance which may initiate pollen germination or contain a substance which acts as an inhibitor to pollen germination.

There is also a considerable difference in plants with regard to their ability to produce viable pollen. L-3, L-131, and L-139 are poor pollen producers when compared with L-21, L-240, and L-130. As a result of this information, planned crosses were made using very fertile females and good pollen producing plants as parents.

The seed production was thereby increased to approximately 40,000 seed. Emphasis was placed on the use of wilt resistant material as parents in the breeding program. Backcrossing and intercrossing were also practiced throughout the pollination period.

Over 10,000 first-year seedlings were grown at Chase, Louisiana, and from these 187 were selected for further testing. This material was selected on the basis of skin and flesh color and potential yielding ability. Promising seedlings selected in previous years were increased for further testing. These include 8-24, 8-31, and 6-84.

Yield Trials—Yield data on the standard varieties and some promising seedlings are found in Table 3.

Heartogold, L-240, and Unit I produced the highest average yields in southwest Louisiana. L-240 and Queen Mary yielded the highest in north Louisiana. Although L-241 was third in the yield test, because of its wilt resistance its importance may be felt where wilt is prevalent.

In advanced yield tests at Chase, Louisiana, Unit I Porto Rico and L-241 gave comparable yields. Heartogold and L-240 were early and produced high yields. The yield of U.S. No. 1 roots for Texas Bunch and Allgold were significantly lower than those of Unit I Porto Rico and L-241.

Analytical Studies—Approximately 180 of the 1950 seedlings were analyzed for dry weight and total pigment. Twenty-five had more than 35 per cent dry matter and 63 had more than 50 mg. of total pigment per 100 gram dry sample. Six of the seedlings had both the high per cent dry matter and total pigment.

Baking tests run on advanced seedlings resulted in keeping the following for further study: 8-24, 8-32, 9-2, 9-18, 9-26, 9-39, 9-65, and 9-65A. Chemical analyses were run on these seedlings and all except 9-2, 9-18, and 9-65A had a dry weight of 30 per cent or more, with 9-65 having the highest, 35.9 per cent. All had a higher carotene content than Unit I Porto Rico, with 9-65 having the highest, 43.1 mg. of carotene per 100 gram dry sample. With the exception of 8-32, analysis showed all had a higher total sugar content than Unit I Porto Rico.

Samples of six varieties and selections, Unit I, Queen Mary, Heartogold, L-224, L-240, and L-241, grown in three localities, Baton Rouge, Scott, and Oak Grove, were analyzed for dry weight, carotene, ascorbic acid, and total sugars. In all cases the potatoes from Baton Rouge had a higher per cent of dry matter than those from Scott and Oak Grove. Those from Oak Grove showed higher ascorbic acid, carotene and total sugars than those from the other two localities.

Root Development Studies—The apparent optimum temperature for root development of sweet potatoes was found to be 70° F.

TABLE 3. Combined Data of Some Promising Seedlings and Standard Varieties of Sweet Potatoes Grown at Different Locations in 1948, 1949, and 1950

Variety or Seedling	Skin color	Sprout Plants per bushel (55 lbs.)	Marketable Sweet Potatoes — Bushels per Acre (55 pounds per bushel)												Disease Reading		Per cent dry matter	Carotene mg./100g dry weight	Cooking test
			Baton Rouge†	Lafayette†	Sunset‡	Lawlett	Grand Prairie†	Scott	Church Point*	Oak Grove*	St. Francisville*	Sweet Potato Farm, Chase*	N. La. Hill Farm Exp. Sta., Homer*	N. La. Exp. Sta., Calhoun*	Wilt	Soil rot			
Unit I																			
Porto Rico.....	Cu	1987	271.8	478.4	303.5	193.7	224.7	211.8	220.0	433.1	160.0	388.4	202.7	185.2	V.S.	V.S.	32.53	6.0	1
Queen Mary.....	Cu	1096	191.2	311.6	244.3	152.1	231.3	228.8	234.2	209.3	182.7	.....	.....	170.7	V.S.	V.S.	28.97	9.3	1
Heartgold.....	Flesh	2363	319.3	548.4	339.0	276.7	310.5	247.8	319.8	.....	286.8	413.4	255.7	212.5	V.S.	M.S.	28.34	7.7	1
L-224.....	Flesh	1450	210.1	485.6	277.0	142.0	202.0	183.7	232.7	.....	.....	.....	222.9	93.6	S.	M.S.	33.63	11.9	2
L-240.....	Cu	1704	298.1	507.5	311.5	217.6	308.4	223.2	272.3	565.0	257.5	415.5	.....	313.1	V.S.	V.S.	30.51	7.2	2
L-241.....	Cu	2666	237.5	403.6	281.2	146.5	210.9	196.6	203.5	245.0	179.0	315.7	208.5	172.7	R.	M.S.	28.40	12.1	1

‡Three-year average

†Two-year average

*One-year average

V.S.—very susceptible

S.—susceptible

M.S.—moderately susceptible

R.—resistant

1—excellent

2—good

3—fair

4—poor

in water media and between 70° and 80° F. in sand media. In general, Unit I Porto Rico produced the largest number and greatest weight of roots. Heartogold produced the fewest number and smallest roots; while L-241 was intermediate in root development. Varieties differed significantly in their response to different temperatures, indicating that they may have different optimum rooting temperatures.

—JULIAN C. MILLER, T. P. HERNANDEZ, J. J. MIKELL,
 JAMES F. FONTENOT, RITA BELLE ATTAYA, A. E. KEHR,
 ROBERT E. WRIGHT, JOHN C. TAYLOR, AND H. K. RILEY.

Irish Potato Investigations

During the fall of 1949 approximately 10,000 seedlings were grown in the greenhouse at Baton Rouge. Selections were made at harvesttime in December and January on the basis of color, size, and number of tubers. Approximately 4,000 red and white tuber selections were kept and divided into two lots. One lot was sent to Crossville, Tennessee, and the second lot was sent to South Dakota. From those sent to Tennessee, 365 seedlings were saved, and 400 seedlings were saved from those sent to South Dakota.

The spring planting at Baton Rouge in 1950 consisted of 166 first year, 27 second year and 13 third year seedlings, all from Tennessee; 146 first year seedlings from South Dakota; and 68 second year, 21 third year and 13 fourth year seedlings, all from Louisiana.

Total solid determinations, storage relationship, and quality tests were made on all varieties and promising seedlings.

Advanced yield tests were conducted at various locations in the state to better evaluate varieties when grown in different areas.

TABLE 4. Advanced Yield Tests for 1950

Variety	Bushels per Acre					
	Diamond	Thibodaux	Hammond	New Roads	Calhoun	Baton Rouge
LaSoda.....	159.8	167.7	229.3	262.4	147.0	200.0
DeSoto.....	178.9	159.7	226.5	270.8	167.9	213.0
Katahdin.....	128.9	162.6	160.3	259.2	89.9	137.1
Triumph.....	84.4	90.8	211.6	200.4	107.3	146.0
Kennebec.....	166.2	154.6	196.6	266.4	123.1	178.0

Based on the performance of the varieties it would be difficult to recommend one variety to be grown at all seven locations, although it appears that DeSoto and LaSoda would probably give the better over-all yields. Both are better in quality than Triumph.

The DeSoto appears to be particularly adapted to the sandier type of soils. The tubers are well shaped, very smooth and retain

their color well even during a wet season. LaSoda appears to be more adapted to the medium and heavy soil types, with no enlarged lenticels. In light soils the tubers are smooth but tend to fade in color during wet seasons.

—RAYMON E. WEBB, JOHN C. NOONAN, JULIAN C. MILLER,
T. P. DYKSTRA, RITA BELLE ATTAYA, RALPH BROWN,
W. F. WILSON, JR., AND JOHN C. TAYLOR.

Shallot Breeding and Improvement

Shallots sold in 1949 added nearly a million dollars to the income of Louisiana farmers. The most serious threats to this million-dollar business are the three diseases yellow dwarf, mildew, and pink root. The nature of these three diseases is such that the only practical control known at present is to develop disease resistant varieties, and consequently this is the primary objective of the present breeding program.

Genetic stocks growing in Baton Rouge include 131 fertile Nebuka-shallot emphidiploids, 23 selected shallot seedlings, 6 shallot varieties collected at different locations in the state, 2 lines of foreign introductions, and one line found to be resistant to yellow dwarf.

—AUGUST E. KEHR AND E. C. TIMS.

Ecological Influences upon Qualities of Strawberries

Studies were made to determine the effect of environmental influences upon ascorbic acid, firmness, soluble solids and total solids of six varieties and selections of strawberries: Klonmore, Konvoy, Marion Bell, 117-1-45-3, 7-90, and 7-42.

Temperature, relative humidity, rainfall, soil moisture, and intensity of sunlight were recorded by automatic instruments in the area where the strawberries were grown.

Laboratory determinations of ascorbic acid, firmness, soluble solids and total solids were made daily immediately after harvesting for 30 consecutive days.

A positive correlation was found between ascorbic acid and intensity of sunlight the day before harvest, two days before harvest, and three days before harvest. No association was found between ascorbic acid and any other factors studied.

A negative correlation was found between firmness and relative humidity, the higher the humidity the less firm the fruit. There were significant differences between varieties.

No correlation was found between firmness and per cent dry weight.

—MIKE GIAMALVA, RITA BELLE ATTAYA, AND P. L. HAWTHORNE.

Tomato Breeding and Variety Trials

Emphasis was placed on the selection of plants resistant to Fusarium wilt. These selections were made from hybrid lines and established varieties. Several lines containing red, globe-shaped fruit looked promising, and these are to be subjected to further trials.

In the spring trial, Gulf State, Earliana, and Dixie produced the highest early yield in the variety trial. Highest total yields were obtained from Southland, Gulf State, Early Market, Lakeland, and Jefferson varieties. Louisiana Allseason gave the highest yields in the fall trials and seems to be the best adapted for setting fruit during high temperatures.

In cooperation with the U.S. Regional Vegetable Breeding Laboratory, additional tomato trials have been conducted with emphasis placed on yield, fruit color, and adaptability to Louisiana conditions.

—JOHN J. MIKELL, RAYMON E. WEBB, AND E. C. TIMS.

Ornamental Horticulture

Construction for this phase of the horticultural program has been about completed according to present plans. During the past year three small prefabricated greenhouses, each of a different type, have been added in the greenhouse area. There is considerable interest in the cheaper types of greenhouses, so it was thought best to add them rather than another of the more expensive kind. Humidifiers were installed in the larger greenhouses. A soil and pot storage and potting shed was constructed. A lumite plastic screen house has also been completed. Both cloth and sash covered propagation beds were built in the lath-house. Several concrete constructed cold frames are also now available for use. An irrigation system has been installed to water field plots. The facilities for conducting experiments with ornamental plants are now very good. Those interested in ornamental plants are invited to come and see what is being done here.

Rose Investigations—The rose planting has now been designated as one of the official Experimental and/or Display Gardens of the American Rose Society. Thirty more varieties were added to the variety test plots. Owing to unfavorable weather conditions, these plants did not make satisfactory growth until late in the growing season. The older, established plants, however, made excellent growth and bloomed very profusely and have at least indicated that many varieties of roses can be successfully grown in this area. Varieties that seemed best last season again were best. There was still no appreciable effect on growth from the application of commercial fertilizer, but the application of manure, either chicken

or cow, did increase growth sufficiently to be noticeable late in the season.

A number of rose stocks have been assembled and when they can be increased and varieties propagated on them, it is planned to test adaptation of the stocks to this area and other areas in the state.

Gladiolus Investigations—A large number of gladiolus seedlings were grown again this year. Numerous selections which seemed promising were made from seedlings grown in the last two years. A few selections are being increased for further trial and possible introduction.

A number of varieties were tested for the first time, some being rather recent introductions. Of these the following seemed promising: Evangeline, Florence Nightengale, Daisy Mae, Blue Bonnet, Miss Chicago, and Cynthia. Some of these are expensive at present, but, if they prove really good, the price will fall rapidly because of increased production.

Propagation of Camellia Japonica by Cuttings—A time of cutting test was set up to determine how soon camellia cuttings could be made satisfactorily after the initiation of spring growth and to compare the rooting response of cuttings made at different dates. July and August are the months recommended for taking camellia cuttings in the South. One hundred cuttings of the variety Sarah Frost were made at weekly intervals, beginning May 17, 1949, and extending through September 13, 1949.

Results of the test indicate that cuttings can safely be made earlier than July and August in Louisiana. Of the 1,200 cuttings put out from May 17 through August 2, 1949, 99.7 per cent formed roots.

A rooting medium test was set up on July 7, 1949, to study the effect of six rooting mediums on the rooting response of seven camellia varieties. The rooting mediums used were sand, vermiculite, one-half peat plus one-half sand, one-half vermiculite plus one-half peat, one-half sand plus one-half vermiculite, and one-third sand plus one-third vermiculite plus one-third peat. The mixtures were by volume. The varieties used in the various mediums were Sarah Frost, Governor Mouton, Floraplana Paeoniflora, Glorie de Nantes, Professor Sargent, Pink Perfection, and Rubra Virginialis.

The results of this test suggest that vermiculite alone and one-half vermiculite plus one-half sand by volume would be preferable to the other mediums used if a large number of varieties were to be propagated. It appears that easy-to-root varieties show little difference in root formation due to the medium used, whereas some other varieties show a decided difference.

A test was set up July 8, 1949, to study the effect of 12 com-

mercial growth promoting substances on the rooting response of Sarah Frost camellia cuttings.

Results indicate that all the materials used were beneficial in obtaining faster rooting of the cuttings.

Cuttings treated with Hormodin No. 3, Quick Root No. 2, and Stim Root produced the most desirable type of root systems. Cuttings treated with Ree-Root No. 2 consistently formed gall-like structures on the treated portion of the stems.

—W. D. KIMBROUGH AND R. H. HANCHEY.

Plant Pathology

Sugar Cane Breeding

In 1950, 53,000 seedlings were grown in pots from seed obtained from Canal Point, Fla. Of these, 14,000 were eliminated because of susceptibility to mosaic, and nearly 36,000 were transplanted to the field.

In addition, promising canes from the 1948 crosses were selected and replanted at Baton Rouge, a total of 500 from 40,000 in the field.

In 1949, a number of seedlings were planted at Columbia Plantation, Franklin, in cooperation with Mr. John Caffery and the United States Department of Agriculture. Selections were made from these canes and were replanted in the fall of 1950. Approximately 70 new seedlings were also planted for the first time at Franklin.

—P. H. DUNCKELMAN, P. J. MILLS, Y. AZAB, AND S. J. P. CHILTON.

Seed Treatment of Sugar Cane

Three-year tests from 1947 through 1949 have indicated that dipping canes, before planting, in 1 per cent solutions or suspensions of Puratized N5E, Phygon and Tersan gave increases both in stands and yields of cane. Tests of the 1949-50 season also showed increases.

Preliminary tests on the cost per acre for seed treatments indicate these will be sufficiently cheap for field use.

—P. J. MILLS AND S. J. P. CHILTON.

Sugar Cane Varieties and Red Rot

Each year, released and unreleased varieties are tested for their resistance and susceptibility to the fungus causing the disease known as red rot. Of the varieties released in the last few years, C.P. 44-101, 44-155, 43-47, 36-105, 36-183, and 36-13 are resistant to this disease. Of the older varieties grown, Co. 290 and C.P. 34-120 are susceptible, and C.P. 29-320 is intermediate.

—P. J. MILLS AND S. J. P. CHILTON.

Johnson Grass and Sugar Cane

In large-scale tests made in 1950, the use of 2,4-D + flame cultivation or of TCA at low rates gave good control of Johnson grass seedlings in plant cane after fallow plowing. Even with the most



Spring application of TCA for Johnson grass seedling control. Upper picture, check; lower picture, pre-emergence spray of TCA.

efficient treatments some hand roguing was necessary, but costs were low. Increases in plant cane and first stubble yields far exceeded the expense of the Johnson grass control program.

In addition, low rates of TCA applied immediately after shaving and off-barring badly infested stubble gave very good increases in yields and reduction of Johnson grass.

There seems little doubt that the use of chemicals for Johnson grass control, when combined with certain modifications of the cultural practices commonly employed, is economically feasible.

—E. R. STAMPER AND S. J. P. CHILTON.



Fall control of Johnson grass seedlings. Pre-emergence spray of 2,4-D plus post-emergence spray of 2,4-D and flame cultivation one week later. Check to left.

Internal Cork of Sweet Potatoes

Although internal cork has not increased to serious proportions in Louisiana since it was first found in 1946, the disease is known to occur rather generally in at least one section of the state, near Shuteston in St. Landry Parish. Sweet potato crops on two infested farms in that section have shown relatively little increase in severity of internal cork since 1948. Examination of potatoes at the time of harvest showed the presence of a "trace" to "slight" cork in 1.3 per cent and 2.0 per cent of the potatoes in the 1949 and 1950 crops, respectively. However, cork severity increased during storage of the 1949 crop, so that after storage 3.5 per cent of the potatoes examined had cork which was classified mostly as "severe" cork.

Extensive studies are in progress on transmission of the virus by insects and other means under field conditions in the affected area. Similar studies are being made under controlled conditions in the laboratory and greenhouse.

Artificial inoculation of newer varieties and seedlings with internal cork virus indicate that Queen Mary, Oklahoma 24, and L-241 are just as susceptible to internal cork as is the Porto Rico variety.

—W. J. MARTIN AND GEORGE FEAZELL.

Chemical Weed Control in Cotton

In the last three years a large number of chemicals have been tested for their weed-killing properties in cotton fields. These tests were made at Baton Rouge, St. Joseph, and Curtis, and include the three major soil types on which cotton is grown in Louisiana.

Very good weed control was obtained by a combination of (1)



Effect of pre-emergence spray on weed control in cotton. Foreground, six pounds of ammonium dinitro secondary butyl phenol to acre; background, no treatment.

a pre-emergence spray with chemicals in the dinitro group, (2) post-emergence sprays with certain oils directed at the base of the young cotton plants, and (3) flame cultivation until layby.

Recommendations for trial by cotton planters are now available.

—L. E. COWART, L. E. CREASY, AND E. R. STAMPER.

Seed Treatment for Drilled Rice

Seed treatments using Arasan, Experimental Fungicide KF-467, and Ceresan gave equally significant increases in rice stands when compared with stands from untreated seed.

The results obtained indicate, as in past years, that seed treatment for assured adequate stands is of value to the rice grower.

—E. H. TODD AND J. G. ATKINS, JR.

Sweet Potato Disease Development in Nematocide-Treated Soils

Certain soils used for growing sweet potatoes are infested with root-knot nematodes as well as with the *Fusarium* wilt organism and various fungi causing rots of sweet potatoes. Although sweet potatoes are considered as fairly resistant to root knot, they commonly are invaded by the nematodes. In order to determine the effects of eliminating nematodes in such disease-infested soils on the subsequent development of disease, two field experiments were made in which plots of soil on two farms were treated with the nematocides DD-mixture and Dowfume W-40.

In the first experiment the soil was known to be heavily infested with both nematodes and the sweet potato wilt organism. Sweet potatoes grown in the plots treated with the nematocides were as severely affected with wilt as those grown in the untreated plots. Thus, eliminating the nematodes in this soil did not affect the development of wilt.

In the second experiment the soil was infested with sweet potato rot organisms. Some of the sweet potatoes grown in all replicates of the untreated plots were affected with minor rots at harvest. Sweet potatoes grown in the plots treated with nematocides were not affected with such rots. The lesions on the potatoes grown in the untreated plots were of the "circular spot" type, and the fungus *Fusarium* sp. was isolated from them.

The above results indicate that nematodes may be important in making avenues of entrance for various fungi which are known to cause lesions on sweet potatoes at points of injury.

—W. J. MARTIN.

Late Blight of Irish Potatoes and Tomatoes

Late blight was not reported on fall potatoes in 1949 nor on the spring crop of potatoes in 1950. Yet in June, 1950, the disease appeared on tomatoes in Lafourche, Pointe Coupee, East Feliciana, Livingston and East Baton Rouge parishes. The outbreak of late blight on tomatoes was unexpected, since the disease had not been reported on the spring crop of potatoes. Occurrence of the disease on tomatoes at that time suggested that other sources of inoculum were present in the state to initiate the disease. A possible source was discovered in fresh-market tomato fruit imported into the state. Active late blight lesions were found in various samples of such fresh-market fruit.

Epidemics of late blight were observed in plantings of fall tomatoes in West Carroll and Ouachita parishes in early October. This was the first record of occurrence of late blight in fields of fall tomatoes in Louisiana.

—W. J. MARTIN.

Control of Tomato Foliage Diseases

In Louisiana tomato foliage may be damaged by any of the following diseases caused by different fungi as given in parentheses: late blight (*Phytophthora infestans*), early blight (*Alternaria solani*), Phoma leaf spot (*Phoma destructiva*), gray leaf spot (*Stemphyllium solani*), and leaf spot (*Septoria lycopersici*). Although early and late blights usually are the most destructive, any of the diseases may cause injury to the plants.

Some commercial growers who are equipped with power sprayers protect their plants from these diseases by systematically spraying them with a fungicide. Such growers ordinarily space their rows sufficiently far apart to permit passage of the sprayer between rows. However, many tomato growers do not have the necessary spraying equipment and they plant their crop on four-foot rows. In the past the majority of the latter growers have not applied control measures, and in many cases severe losses were experienced as a result of these diseases.

In the fall of 1950, experiments were started to determine the relative effectiveness of dusting versus spraying fungicides on tomato plants to protect them from the foliage diseases. If dusting were sufficiently effective, considerably less expense would be involved in purchasing the necessary equipment. In the field of tomatoes used for the experiment Phoma leaf spot was the only disease which appeared in severe form. Six fungicidal applications were made at weekly intervals beginning with the appearance of the first cluster of flowers. Results from this test indicate that yields may be increased considerably by either spraying or dusting when Phoma leaf spot is present in severe form. However, with each of the three fungicides used in the test, spraying resulted in higher yields than did dusting. One of the spray treatments gave a 50 per cent increase in yield over the untreated check.

Numerous tests under different conditions for disease development will have to be made before comparative data are available on dusting versus spraying for controlling the five diseases listed above.

—W. J. MARTIN AND L. ROURE.

Forage Crop Diseases

Lespedeza Diseases—Observations and preliminary studies indicate that three important causes of Lespedeza dying prior to maturity are Rhizoctonia aerial blight, southern blight (*Sclerotium rolfsii*), and the three-cornered alfalfa hopper (*Stictiocephala festina*). Each of these three pests has been shown to be capable of killing or severely damaging Lespedeza in controlled tests. In 1950 southern blight was very destructive on Korean Lespedeza in experimental plantings but was not found on Kobe or common. The alfalfa

hopper probably causes more damage, in general, than diseases. Nearly 100 per cent of the plants have been found to be girdled by the feeding of this insect. "Disease" symptoms associated with alfalfa hopper injury are yellowish leaves, sparse foliage, poor vigor, enlarged stems and a slow wilt or dead plants. Girdled plants often exhibit a root or basal stem rot which has been found to be associated with weakly pathogenic soil fungi. —J. G. ATKINS.

A New Vetch Anthracnose Disease—During the past two years a species of *Colletotrichum* has been found on severely diseased



Leaf, pod and stem spots on common vetch caused by a new anthracnose.

common vetch, particularly in the southern part of the state. This anthracnose, when favored by rainy weather during late winter and spring, causes a very destructive foliage blighting. The disease starts as leaf and stem spots but eventually causes a complete dying of leaves and stems. A large number of different vetch species and selections have been tested for resistance in greenhouse inoculation series. *Vicia villosa* (hairy), and *V. atropurpurea* (purple) were resistant species. *V. sativa* (common), *V. dasy-carpa* (woollypod), *V. pannonica* (Hungarian), *V. mon-antha*, *V. grandiflora*, and *V. angustifolia* were susceptible. Austrian Winter, Dixie Wonder, and Creole peas were moderately susceptible in greenhouse tests. Under field conditions

the disease has been found only on peas growing adjacent to severely diseased common vetch. The fungus causing the new anthracnose disease of common vetch has been studied and found to differ from *C. villosum*, which causes a similar disease of hairy vetch.

—N. L. HORN AND J. G. ATKINS.

Rhizoctonia Blight of Trefoils—The trefoils, *Lotus* spp., in small experimental plantings of the Crops and Soils Department, have been observed to make good growth during the cooler months and then exhibit poor growth and dead foliage in late spring or early summer. A *Rhizoctonia* blight appears to be as important, or more important, than the effect of higher temperatures upon this cool weather legume. Warm, moist weather which often prevails in

late spring and early summer provides ideal conditions for the development of this disease. The trefoils are very susceptible to this fungus. Although the trefoils are perennials, observations indicate that they may not persist as such when *Rhizoctonia* blight is severe. Due to their extreme susceptibility to *Rhizoctonia* blight, the trefoils cannot be considered as promising legumes for south Louisiana.

Winter Legume Nursery and Field Tests—At Baton Rouge winter legume nursery and variety tests were planted on land where common vetch had been severely diseased the previous year. Through the cooperation of the U.S. Department of Agriculture a total of 65 collections of *Vicia sativa*, common vetch, were evaluated for disease resistance in a nursery planting. Only one of the common vetches, FC 29933, showed any resistance to the new anthracnose disease and root diseases when compared with commercial common vetch. Hairy and purple vetch were resistant to anthracnose and the root-rot complex. In a variety test using commercial seed, Hungarian and four lots of common vetch, including Willamette, were susceptible to these diseases, but hairy vetch was resistant. Although common vetch made an earlier growth than hairy, plots planted with hairy vetch showed excellent growth by late



Resistance and susceptibility of vetch. Left, common vetch killed by disease; right, hairy vetch resistant to disease. (Picture in March, 1950.)

March when common vetch was dead from diseases, chiefly anthracnose and root rots.

Two pea varieties developed by the U. S. Department of Agri-

culture were tested and found to be more resistant to the diseases known as the root-rot complex and the *Ascochyta* blights, than Austrian Winter and Dixie Wonder peas. These two new winter peas are similar to the Austrian Winter pea in growth type. The 1949-50 tests at Baton Rouge indicated that the Dixie Wonder pea is not superior to the Austrian Winter pea when planted in soil infested with disease organisms.

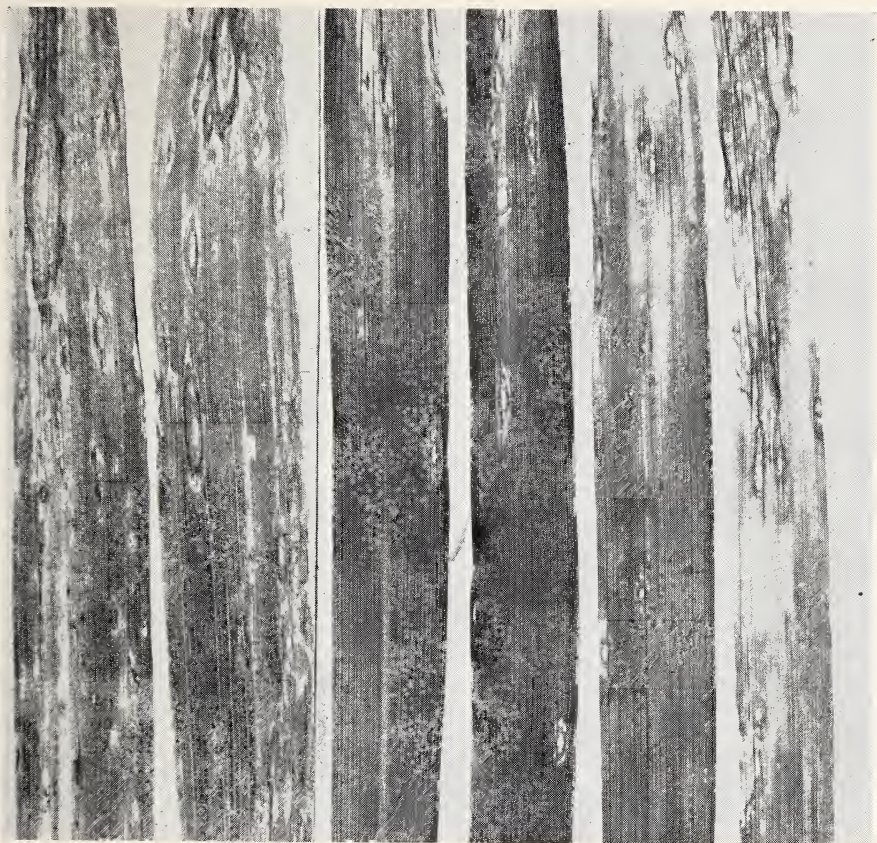
A test in Franklin Parish was planted on a farm where winter legumes had grown very poorly. Hairy vetch and Singletary peas were disease resistant and gave satisfactory results. Austrian Winter and Dixie Wonder peas, Willamette, domestic common, imported common, and Hungarian vetch showed extremely poor growth in March. Since hairy vetch has been found in greenhouse and field tests to be more resistant to diseases than common vetch or Austrian Winter peas and appears to be capable of producing a very satisfactory growth where the other winter legumes fail, growers may find hairy vetch a satisfactory winter legume. Recommended agronomic practices should be followed.

Fescue Diseases—Two fungus diseases are known to attack such fescues as Kentucky 31 in Louisiana. *Helminthosporium dictyloides* causes dark net-like blotches or spots on the leaves during the winter and spring months. Although this disease is often very prevalent and probably causes considerable damage, the fescue plants are generally not killed and continue to grow. In 1950 *Rhizoctonia* leaf blight or blotch appeared in early June. This fungus completely killed the leaves in areas within a field. Since the fescues are valued for winter and spring grazing, it is probable that *Rhizoctonia* blight may not be of much importance in affecting their forage value. Observations indicate that diseased plants are completely killed and that second year stands may be poor. Thus, with this disease present, fescue may not behave as a perennial in certain areas of Louisiana.

—J. G. ATKINS.

Oat Disease Research—In cooperation with the Crops and Soils Department, disease readings were made on nursery plantings containing various old and new oat varieties and promising selections. Crown rust was severe in 1950 throughout the state. Owing to the presence of Race 45 or similar races, the Bond varieties, such as Camellia and Clinton, were severely affected. In 1949 and 1950, crown rust was, in general, the most destructive oat disease. *Helminthosporium* or Victoria blight was severe on certain susceptible varieties in experimental plantings at Baton Rouge and Crowley. Among the older oat varieties, Alber and its selections were most promising. Although Alber cannot be considered as a crown rust resistant variety, it will probably give more satisfactory yields than many other varieties.

The fungus causing *Helminthosporium* blight, *H. victoriae*, has



Leaf spot on oats caused by *Helminthosporium victoriae*. Natural infection on two leaves on left; four inoculated leaves on right.

been found to cause a leaf spotting of certain oat varieties, such as Victorgrain, Fulgrain, Letoria, and DeSoto. Susceptible varieties in the heading or dough stage of growth often show extensive leaf spotting. Previously this fungus was known to cause seedling blight with a foliar striping of young leaves and to attack the basal culm tissues with resultant lodging and low yields. However, in Louisiana, leaf spots must also be considered a symptom of this disease of oats.

—J. G. ATKINS.

Quick Decline of Citrus

Quick decline, or "Tristeza," is a very destructive virus disease of citrus affecting certain scion-stock combinations, particularly sweet orange on sour orange rootstock. It has destroyed the bulk of citrus culture in Argentina and Brazil and is causing increasingly

severe losses in California since its first appearance there about 1939. A disease fitting the published description of quick decline was first observed in the Boothville area of Plaquemines Parish in June, 1950, but there are indications that the disease had been present in this area for probably one to two years previous to that date. Thus far, the disease has killed about 500 trees, all sweet oranges on sour orange rootstock. Several scientists from the U.S. Department of Agriculture and the Citrus Experiment Station in Florida, who have had experience with the quick decline disease and were familiar with its symptoms, visited Louisiana and examined the affected trees, and all were of the opinion that the disease in Louisiana was in all probability quick decline. The only sure way of determining whether or not the disease is quick decline is to test its transmissibility by budding susceptible rootstocks with budwood from affected trees.

On July 20, 1950, Valencia budwood was taken from the grove in which the disease occurred in Boothville and budded into two-year-old potted sour orange seedlings in Baton Rouge. The budwood was taken from eight different trees, some showing definite disease symptoms and some apparently healthy but growing next to diseased ones. As a check, healthy budwood was taken from Valencia trees growing in the northern extreme of the citrus area (Magnolia) and budded into sour orange seedlings. The budded trees were kept outdoors until November, then placed in the greenhouse.

Transmission has been secured. First indication of transmission appeared 4½ months after budding, when one of the budded trees wilted and died. This was followed 2-3 weeks later by five other trees developing disease symptoms, pale-green color, vein chlorosis, shedding of leaves, and by the sudden wilting and death of another tree. All the trees arising from healthy budwood are still healthy and growing.

—A. G. PLAKIDAS AND C. A. SCHEXNAYDER.

Breeding for Disease Resistance in Onions and Shallots

In 1948, a cooperative breeding project was started between the United States Department of Agriculture (a part of the National Onion Breeding Program) and the Department of Plant Pathology, for the development of disease resistance in onion and shallot. The crosses were made at Beltsville, Maryland, by Dr. H. A. Jones and the actual field testing for disease resistance and selecting for commercial type was done at Baton Rouge.

Onion Breeding—Onion mildew or blight continues to be the limiting factor in the growing of Creole onions in Louisiana. Many farmers have stopped growing onions because of the disastrous mildew epidemics of 1946, 1947, 1949, and 1950. Production of onions for the market was 220,000 sacks (50-pound sacks) in 1945; the yield

was reduced to 130,000 sacks in 1949. This reduction was largely attributed to severe damage from mildew. The development of a



Onion seedlings (F_2) from crosses between Calred (resistant to mildew) and Creole (susceptible to mildew).

mildew-resistant strain of Creole onion would materially aid the onion growers of Louisiana.

The common Creole variety has been crossed with the Calred, a mildew-resistant variety developed in California a few years ago. Several crosses were made at Beltsville and the progenies tested at Baton Rouge. In the 1949-50 season 6,822 F_2 plants were tested in the field and greenhouse. A heavy mildew epidemic in the spring of 1950 was favorable for testing the disease resistance of a large number of seedlings. Preliminary selections were made of plants showing some apparent resistance to leaf infection. A total of 573 out of 5,142 plants in the field showed some indication of resistance. These bulbs were stored and those that kept through the summer were planted in the fall of 1950 to be tested for seed stalk resistance. In addition about 5,000 F_2 seedlings of a reciprocal cross Creole X Calred, and 500 plants from the first backcrosses from the Creole-Calred hybrid back to Creole were set in the field for further testing.

Shallot Breeding—The two most important diseases at the time the project was started were “pink root” and “yellow dwarf.” Most of the shallots being grown at the present time are susceptible to both diseases. In 1949 and 1950, another disease, “downy mildew,”

caused serious losses in shallots. This is the same mildew disease that also causes heavy losses in onions. The breeding project has been expanded to include resistance to mildew.

The Nebuka onion, *Allium fistulosum*, is immune from all known strains of the yellow dwarf virus and is highly resistant to the pink root fungus. The first crosses were made between *A. fistulosum* and the common shallot in 1949. The F₁ diploid seedlings were treated with colchicine and the chromosome number doubled. Ninety-nine lots of these polyploids were tested in the field for resistance to pink root and yellow dwarf in 1950. No yellow dwarf appeared in any of the plants although they were exposed to infected plants for several months. However, a number of the lots showed some susceptibility to pink root. Practically all the plants were large and coarse and divided quite slowly as compared with the ordinary shallot.

The progeny from the first crosses between the Nebuka onion and the common shallot were apparently immune to yellow dwarf and most of them were resistant to pink root; but the plants had few of the desirable shallot characters. Most of them were too large and coarse for commercial use and only three of the 99 lots formed bulbs. The others remained green during the late spring and early summer when the ordinary shallot matures, forms bulbs and the leaves die down. In 1950, a series of backcrosses was made from the shallot-Nebuka amphidiploids to the common shallot in an effort to get the more desirable characters of the shallot into the progeny. Some 33 lots of the backcrosses are being tested in the field in the spring of 1951.—E. C. TIMS AND WARID A. WARID.

Control of Corky Excrescence of Camellias

The cause of this striking but not particularly serious disease, popularly called by such names as "cork," "cork scale," "scurf," etc., has been a puzzle for many years. As information from the study of this trouble gradually accumulated, it became more and more apparent that the disease was of physiogenic rather than parasitic nature, and particularly that it was probably due to fluctuations in soil moisture. This idea was strengthened by the results of a limited test in 1949, in which the disease was prevented by spraying with a wax emulsion. In the summer of 1950, wax emulsion (1 part wax emulsion in 30 parts of water) sprays were applied to a relatively large number of plants in two localities, Baton Rouge and Hammond. The plants in Baton Rouge were sprayed four times—June 14, July 17, Aug. 11, and Sept. 15; in Hammond, the July spray was omitted. Sharply clear-cut results were obtained. Practically 100 per cent control resulted from the wax spray. The non-sprayed check plants developed moderate to severe cork. Spraying with a copper-zinc-manganese formulation (fungicidal-mineral spray) gave no control. These results, besides providing a practical

control for this puzzling disease, gave additional support to the idea that corky excrescence is due to unbalanced water relations. It is believed that the wax spray reduces the transpiration rate by partly sealing the stomata.

—A. G. PLAKIDAS.

Relative Susceptibility of *Camellia Sasanqua* and *C. Japonica*, Var. *Sarah Frost*, to Root Rot

Previous work (published) has shown that *Phytophthora cinnamomi* is capable of causing root rot of camellias. *C. sasanqua*, and the *Sarah Frost* variety of *C. japonica* are among the root stocks most commonly used in grafting camellias. It was, therefore, considered of practical interest to test the relative susceptibility of these two root stocks to *Phytophthora* root rot. Rooted cuttings were planted in sterilized soil artificially infested with pure cultures of *P. cinnamomi*. The results showed a sharp difference in the susceptibility of the two root stocks toward this fungus. Under the admittedly drastic conditions of the experiment (the soil was heavily infested with the fungus) 95 per cent of the *Sarah Frost* plants were killed. In contrast, 95 per cent of the *C. sasanqua* plants survived and grew, their growth being only slightly less than that of the control plants growing in non-infested soil.

—A. G. PLAKIDAS.

The Chemical Control of Chickasaw Rose

In studies on the control of Chickasaw roses in pasture areas, comparisons were made between various forms of 2,4-D, 2,4,5-T and 2,4-D, and between water, oil, and oil emulsions as carriers for the herbicides. In most instances the 2,4-D was more effective than the 2,4,5-T. Of the 2,4-D materials tried, the isopropyl ester was most effective, the triethanole amine salt applied in a 10 per cent non-phytotoxic oil emulsion was somewhat less effective, and the triethanole amine salt applied in water was relatively ineffective. Where blanket applications of 2,4-D were made in the spring the injury to the sod was nominal and recuperation was usually prompt. However, when blanket applications of 2,4-D were made in the fall, the pasture was usually damaged considerably.

By employing the more effective herbicidal treatment, such as 2 or 3 pounds of isopropyl ester of 2,4-D per acre in the fall and spring, considerable reduction in number, size, and vigor of Chickasaw rose plants was obtained.—M. E. GERTSCH AND E. R. STAMPER.

Comparative Pathogenicity of Two *Colletotrichums* of Easter-Lily Bulbs

In 1944, the writer described *Colletotrichum lilii* sp. nov. as the cause of "black scale" disease of Easter-lily bulbs. A second *Colleto-*

trichum, morphologically similar to *C. lilii*, is associated with scale-tip rot of lilies in Oregon, and several inquiries have been received from lily growers, pathologists, and inspectors as to whether or not this is identical with *C. lilii*. Isolates of the Oregon fungus were obtained from Oregon-grown bulbs and were used in pathogenicity tests on Creole lilies (*Lilium longiflorum*) in comparison with cultures of *C. lilii*. The Louisiana Colletotrichum (*C. lilii*) caused severe black scale symptoms on all bulbs grown in soil artificially infested with it. In contrast, the Oregon Colletotrichum did not cause black-scale symptoms. Culturally, the Oregon Colletotrichum differs from *C. lilii* in rate of growth and color of colony, but the conidia of both are similar in shape and size. It is concluded that the Oregon lily fungus is different from *C. lilii*.
—A. G. PLAKIDAS.

Foot Rot, Leaf Blight, and Stem Canker of Hibiscus

In recent years, Chinese hibiscus (*H. rosa-sinensis* and *H. schizopetalus*) has become a popular summer flowering shrub in Louisiana and other southern states. At the same time, certain diseases, apparently new and undescribed, have been found affecting this host. One of these is a typical foot rot affecting the crown and main roots and killing the entire plant. This disease has been found occurring outdoors and in lath-houses. The variety Kona appears to be the most susceptible but the disease has been found on about 18 different varieties. Foot rot has been shown experimentally to be caused by a *Phytophthora* which has been identified as *P. cactorum* var *applanata*.

A leaf blight and stem canker were found under high humidity conditions, for example in houses where the plants were being propagated by aerial layering (Marcottage) and were syringed often. A second *Phytophthora* has been isolated from the leaf lesions and has been shown by inoculation to be capable of causing leaf blight. The leaf blight *Phytophthora* is distinctly different from the one causing foot rot. It has been tentatively identified as *P. palmivora*.

Colletotrichum sp. has been found fruiting on the stem cankers. It was isolated in pure culture, but failed to cause infection when inoculated into healthy stems.—M. O. JAMES AND A. G. PLAKIDAS.

Poultry Research

Improvement of the Cornish Breed

Twelve Cornish breeding pens were mated in 1950. Two of these were yearling hens mated to cockerels. A total of 1,379 eggs was set from which 1,142 chicks were hatched, yielding an 82.8 per cent hatch of all eggs set. Good reproductive ability has been maintained in this stock for several years. A new phase of the project was initiated this year, in which two White Cornish males were crossed to Dark Cornish females. Fertility was poor in these two pens, averaging only 71.2 per cent, with a hatchability of 50.1 per cent of all eggs set. In addition a case of White Cornish eggs was purchased and hatched for use in crossbreeding and development of a line of White Cornish. Hatchability was good, 76.8 per cent of all eggs set. Growth rate was improved materially over the previous year. Of the Dark Cornish, males averaged 3.4 pounds and females 2.6 pounds at 12 weeks as compared to 2.8 and 2.25 last year. The crossbreds averaged 3.2 and 2.4 for males and females, respectively. The White Cornish averaged 3.1 pounds for males and 2.5 for females. Although viability was good in the Dark Cornish stock, severe selection was practiced and only 300 pullets were housed. Major consideration was given to growth and feathering in the growing stock. Sixty-three White Cornish and 31 crossbred pullets were housed this fall. Color patterns were extremely varied in the cross of Dark and White Cornish, ranging from white flecked with black to solid black, with a considerable number of barred birds. Rate of feathering was usually fast in the Dark Cornish and generally slow in the pure Whites. Sex-linked feathering was checked this year at 10 days and at 8 weeks. Because of feather picking in the brooder house the results were not accurate at 8 weeks. It is hoped that a better check can be made this year. It appears that good progress is being made toward the development of a broiler strain of Cornish with better than average productive qualities.

—ERNEST WILLIAMS AND C. W. UPP.

Growth Study with Dark Cornish

One portion of the study made with the Dark Cornish breed is an intensive correlative study of growth pattern as indicated by body weight, shank length, anterior body depth, length of sternum, and breast width. Observations were made (using 384 chicks) at weekly intervals to 12 weeks of age and with 197 chicks at 4-week intervals thereafter to 28 weeks of age. Sex differentials were

noted as well as changes during growth as age advanced. One practical conclusion reached was the relatively high correlation of body conformation at 12 and 28 weeks of age. It appears that breeding stock may be selected at the twelfth week for body weight, shank length and keel length, with a relatively high degree of accuracy.

Early indications of sex differentiated growth patterns were observed as indicated by the following results. Weight of the sexes differed significantly at one week of age; and at three weeks of age and after, the differences were highly significant. The sex difference in shank length was highly significant on the date of hatching and thereafter. This observation had not been reported previously.

—J. C. GILBREATH AND C. W. UPP.

Inbreeding White Plymouth Rocks

The practical poultryman may question the value of inbreeding chickens since inbreeding usually decreases the productive qualities of *the inbred lines themselves*. The ultimate objective in inbreeding chickens is the same as the hybrid corn producers have used so successfully, namely the production of "hybrid" chickens by crossing two, three, or four inbred lines. Inbreds may be used also to "topcross" standard breeds of chickens. The ultimate place that hybrid chickens may take in poultry production is not known, as yet. To give some indication of the problems involved in the production of inbred lines, results with inbred White Plymouth Rocks are given, briefly. For the 1950 breeding season, approximately 90 brother-sister inbred White Plymouth Rock matings were made up and housed in special breeding coops. These parents were 25 per cent inbred and produced progeny of 37.5 per cent inbreeding. A total of 1,168 chicks was hatched and pedigreed. Hatchability was approximately 20 per cent lower in the inbreds than in the R.O.P. strain of White Plymouth Rocks. Some individuals as well as whole families of sisters, however, equalled or exceeded the average for the R.O.P. stock. In the matter of fertility, body weight to eight weeks, maturity, and rate of feathering, the inbred stock held its own with the R.O.P. stock. However, losses from all causes for the year 1950 were considerably higher than those of the R.O.P. stock. Average production of the 1949 hatched inbred pullets that finished the laying year in the fall of 1950 was 80.1 as compared to 150.9 eggs, a difference of 70.8 eggs in favor of the R.O.P. stock. It should be pointed out, however, that five inbreds met R.O.P. qualifications while several others lacked just a few eggs. There was no great difference between the inbred and R.O.P. pullets in egg weight and body weight. However, for average age in days at first egg, the 1949 hatched inbred pullets matured at an average of 19 days later than the R.O.P. pullets; and the 1950 hatched inbreds matured an average of 46.5 days later than the R.O.P. pullets. Here again, there



Details of one of 50 individual mating pens in the inbreeding experiment. Note separate pen for the male and female (placed together three times each week), the sloping floor in pen for hen, outside feed and water troughs, and wire floors.

were exceptions, as several dozen of the 1949 and 1950 hatched inbred pullets matured at from 160 to 210 days. Fifty brother-sister matings have been made up for the 1951 season. Several other types of matings are being made also, such as testing several promising inbred lines on each other and on open bred White Plymouth Rocks, as well as crossing them with other breeds. Six small hatches have been taken off for the 1951 season, and it appears as if fertility and hatchability are major problems. It is apparent that problems tend to increase as inbreeding increases.—B. A. TOWER AND C. W. UPP.

Breeding, Season of Year and Diet Affect Broiler Growth

The breeding back of the stock used is of even more importance than is designation of the breed in determining the rate of growth obtained. For example, one broiler strain of New Hampshires averaged 3.8 pounds at 12 weeks of age and another 3.9 pounds, whereas a third strain of New Hampshires fed the same diet in the same experiments averaged 3.1 pounds. In the same trials one crossbred

stock averaged 3.3 pounds, while a third weighed 2.8 pounds on the average.

The season of the year in which the broilers are grown is also of importance in this state. In one series of experiments lots started in the spring (4 strains on same diet) averaged 3.0, whereas a like number started in the early fall weighed on the average 3.3 pounds and a third series started in late fall averaged 3.6 pounds. In another series of experiments with different stock and diets, spring broilers averaged 2.7 pounds, early fall 2.9, and late fall 3.1 pounds.



These broilers, produced experimentally, illustrate the quality from good stock on adequate rations.

Diet is generally recognized as one of the most important factors influencing growth. Chicks fed the "Connecticut," high efficiency diet averaged 3.0 pounds and a similar diet using Louisiana produced ingredients, produced an average of 3.1, whereas chicks fed a higher fiber, less fortified diet, averaged 2.6 pounds. R.I. Reds bred for egg production were used in these tests.

The various forms of feed (i.e., pellet, granular and mash forms) have all been advocated as producing greater gains. In three trials at this station little consistent advantage was found for any one form of feed when a highly fortified broiler ration was used. Aver-

age weights obtained were 3.0 for mash, 3.0 for pellets, and 3.1 for granular feed.

—C. W. UPP, C. K. ALLEN, W. I. STEWART, AND C. C. WILLIAMS.

Meat Yields of Broilers

Consumers of broilers are interested ultimately in the amount of edible meat obtained rather than gross live weight, N.Y. dressed weight, or eviscerated weight of market birds purchased. It has long been taken for granted that these go hand in hand yet there may be strain and breed differences in percentage of meat yield as well as differences for birds of different ages. In two trials with 12-week-old broilers of seven different strains some indications of differences in meat yield were obtained. The highest percentage of edible meat (exclusive of giblets and neck meat) was 37.5 per cent of the live weight. The lowest figure was 27.4 per cent of live weight. To date the highest yield has been with females of a strain of the Cornish breed and the lowest with males from a strain of New Hampshires. Males of another strain of New Hampshires averaged 33.0 per cent edible meat based on live weight. It is evident that differences in percentage of meat yield may be found in different stock. Further tests are being made.

—G. B. CHAMPAGNE AND H. E. HATHAWAY.

The Inheritance of Morphological Abnormalities

Breeding tests to determine the possible inheritance and methods of eliminating four undesirable characters were continued this year. Some 3,000 birds were hatched from 12 breeding pens in each of which two males were used in sequence; i.e., 24 sires were tested.

The characters under study include spike comb, long lower beak, telescoped comb, and the absence of serrations in the comb.

Of 217 progeny classified from spike to spike comb matings, 203, or 93.5 per cent, were affected. All such progeny would be affected if a completely expressed simple recessive were involved. In matings of normal to normal combed birds, which were offspring of spike to normal matings, 1,014 progeny were classified. Of these, 334, or 32.9 per cent, were spiked. If spike comb were a simple recessive such matings would produce only 253 spiked progeny in a total of 1,014. These results offer conclusive evidence that spike comb is inherited as a recessive character but equally demonstrate that it is not inherited simply, nor is it completely expressed.

The long lower beak condition was present in 74.9 per cent of 283 progeny from matings in which both parents were affected. This is a slight increase over previous years. These two characters, based on results of this and previous years, are inherited as recessives although not as clear cut simple recessives.

In the telescoped by telescoped matings, 85.9 per cent of the progeny were affected, which is a marked increase in the expression of this character as compared to previous matings. The age at which birds are classified is an important breeding factor. From dams classified as normal during the breeding season, but which had been telescoped at a younger age (4 or 8 weeks), 86.9 per cent of 149 progeny had telescoped combs. The mode of inheritance of this character has not been determined as yet.

Two pens each mated in sequence to two males were used in the non-serrated comb study. A summary of the progeny of non-serrated comb females mated to non-serrated comb males shows that 190 progeny, or 72.2 per cent, had non-serrated combs, while 73, or 27.8 per cent, had serrated combs, with the number of points varying from three to eight. This ratio suggests that non-serrated comb may be inherited as a simple autosomal dominant. Matings are being continued during the current year in further study of this trait.

This year another character, the presence of a black pigment in the abdominal fat and connective tissues of broilers, was added to these breeding experiments. This discoloration is very detracting to the appearance of the dressed carcass and may be of significant economic importance if the area involved is large enough to warrant removal of the abdominal tissue. The pigment is recognized in live birds by the bluish green appearance of the abdomen in the area between the pubic bones and the end of the keel bone on either side of the abdominal feather tract. It is most easily detected externally at 4-12 weeks of age. Breeding tests are under way to determine the possible inheritance of this trait.

—W. D. BLACKWELL AND E. WILLIAMS.

Holding Conditions for Market Eggs

The possibility of treating market eggs on the farm and by the first handler or buyer has been investigated at this station. Eggs treated with oil or S-100, a cream like preparation, preserved the quality to a surprising degree. These tests were run on small (simulating farm conditions) and large (processor or first handler) samples of eggs with the eggs held at room temperature for two months and at refrigerated temperatures for longer periods.

There has been great improvement and much interest in the washing of dirty eggs for immediate consumption. It has been impossible for all washed eggs to be funnelled to immediate consumption, and great numbers are going into storage. The poultry industry has suffered, and is suffering, great losses due to a "sour egg" condition and mold which develops during storage of washed and oil treated eggs.

Preliminary work indicates that S-100 and oil treated eggs have

a lower 14-day weight loss when temperature and humidity are controlled by using a conventional type incubator. A greater 14-day weight loss occurred in washed eggs than in non-washed eggs.

Clean or dirty eggs that were washed exhibited no difference in loss from mold or rot when held for 14 days at room temperatures averaging 83° F. and relative humidity averaging 86 per cent.

—H. E. HATHAWAY AND R. J. CHAMPAGNE.

A Preliminary Report Comparing Lindane* and Nicotine Sulphate in the Control of Poultry Lice

Lindane (1.5 per cent solution in varsol) painted on the roosts and sprayed directly on the birds at night proved more effective in controlling both body lice (*Eomenacanthus stramineus*) and shaft lice (*Menopon gallinae*) than nicotine sulphate painted on the roosts. Of the two methods of using Lindane, spraying it directly on the birds at night appears to be the most promising way to use it, as it is



Note the nits (clusters of eggs) of the body louse commonly found on the abdomen when infestation is heavy. Lindane, a new material, has been found very effective in controlling body lice and shaft lice.

very effective, is cheap, and is easier to apply. There was no evidence that irritation to the eyes or other harm was done to the birds that were sprayed with Lindane. There was also no evidence that Lindane caused a loss in egg production. This preliminary work

*The purified gamma isomer of benzene hexachloride (99.6 per cent pure).

with Lindane indicates that both body and shaft lice of poultry can be satisfactorily controlled, on a flock basis, by a treatment every 10 or 12 weeks.—B. A. TOWER, DEWEY McNIECE, AND C. W. UPP.

Storage of Frozen Poultry

Discoloration of the flesh around the long bones and of the long bones themselves is due to the hemolysis of red blood cells of the bone marrow. The hemoglobin is liberated through the small foramen of the bones and causes the discoloration. This has been a limiting factor in the public acceptance of frozen poultry.

Studies have yielded the following information:

1. Method of slaughter has very little if any influence on the degree of discoloration in fryers.
2. Only slight differences were found in the degree of discoloration in fryers when precooled in tap water (80° F.), ice slush (33° F.), or still air (36°-40° F.).
3. Freezing in an air blast type freezer at 15° F. or in CO₂-alcohol solution at -70° F. does not appreciably affect degree of discoloration.
4. Slight discoloration is present in fryers held without freezing for 24, 36, and 48 hours.
5. There is a slight difference between sexes in degree of discoloration. Females exhibit less discoloration than males.
6. There are indications that cooking increases the degree of discoloration, but no differences exist between frozen cooked and thawed cooked tibia and femur.

The effect of wrapping material and storage time on discoloration of the flesh around the long bones and of the long bones themselves was studied during the past year. Three lots of 20 fryers each, 13 weeks of age, were killed and chilled. The tibias and femurs were removed from the carcass, separated, and wrapped in either aluminum foil, "Double Wound" or Kraft butcher paper (45 pound). These were stored at 15° F. for nine months. They were then cooked and observations made.

The wrapping material affected the appearance, taste, and degree of discoloration. The aluminum foil and "Double Wound" were both superior to Kraft butcher paper in preventing freezer burn and discoloration.

The discoloration scores on these tests were not appreciably different from scores on other tests in which other methods of packaging were used.

—H. E. HATHAWAY AND C. W. UPP.

Rural Sociology

The Health Status of the Aged in Rural Louisiana

Although a gradual aging of our population has been going on for many decades, its implications are only now beginning to be understood. The fact that the proportion of old people has been steadily increasing can be observed from census reports. In 1910, for instance, one individual in 22 in the rural United States was 65 years of age or over. By 1940, in contrast, one rural person in 14 was 65 years or over. From 1910 to 1940, our national population increased by less than one and one-half, but during this 30-year period the number of persons 65 years and over more than doubled.

Data for Louisiana show clearly that this state has shared in the national trend toward larger numbers and proportions of elderly people. In 1910, men and women aged 65 and over amounted to one person in 48 in rural Louisiana; in 1940, they numbered one in every 21 persons. By comparison, people over 65 years of age in urban Louisiana numbered one in 28 persons in 1910 and one in 19 persons by 1940. The proportion of the aged in rural Louisiana in 1940 was still smaller than in the cities, while in the nation as a whole the proportions were approximately equal in both rural and urban residential areas. The census data demonstrate further that in both the nation and the state aged men outnumbered aged women in the rural-farm population, whereas there were relatively more women than men in the same age groups in the rural-nonfarm population.

This aging of our population has great social significance for the rural world. The factor of residence has an important effect on the health of older people. Life tables constructed for Louisiana make it clear that rural Louisianians can expect to live longer than the urban people of the state. This difference prevails among both the white and the Negro populations. The life expectancy of urban white males under one year of age in 1940-41 was 57.64 as compared with 64.96 years for rural white males. At ages one through four, urban white males had a life expectancy of 60.04 years, while rural white males could expect to live 67.06 years. For those aged 50 through 54 years, the expectation of life exhibited the same differential in favor of rural people: urban white males had a life expectancy of 18.09 years compared with 23.70 years for rural white males.

Although rural Negroes as compared with urban Negroes enjoy the favorable residential differential in expectation of life, all

Negroes in Louisiana could expect fewer years of life at all ages than white persons. In the age class under one year, for instance, urban white males had a life expectancy 12.17 years greater than urban Negro males. At ages 50 through 54 the difference in life expectancy in favor of urban white males over urban Negro males was much smaller, amounting to only 3.00 years. Rural white males also had a higher expectation of life than rural Negro males, but the differences were smaller: 7.53 years for those under one year of age, and only 1.59 years for men 50 through 54 years of age.

In all cases, women have a greater life expectancy than men. Thus, for ages one through four years urban white females in Louisiana had an expectation of life 8.43 years greater than urban white males in the state. Urban Negro females could expect to live 4.73 years longer than urban Negro males of the one-through-four age group. The differential in favor of females is much lower for rural areas, however. Rural white females had a life expectancy 2.00 years greater than that of rural white males at ages one through four. The life expectancy of rural Negro females was 1.18 years greater than that of rural Negro males in the same age category.

In Louisiana as a whole, the ten major causes of death of persons 65 years old and over in 1949 were heart disease, cancer and other malignant tumors, nephritis and nephrosis, pneumonia and influenza, diseases of the digestive system, accidents (other than motor vehicle), vascular lesions affecting the central nervous system, tuberculosis, syphilis and its sequelae, and motor vehicle accidents. When the data are tabulated so as to permit an analysis of causes of death for people over 65 years on the basis of whether they live in rural or urban environments, it is expected that significant differences for the two residential areas will be found.

In 1949, heart disease took a much greater toll of the aged than of the general population of the state. Over 46 per cent of the aged died as the result of heart disease, compared with about 34 per cent of the general population. Cancer and other malignant tumors ranked second in importance for both groups. Nephritis and nephrosis held third rank for the aged but was in ninth rank for the total population. Nevertheless, nephritis and nephrosis accounted for only 3.6 per cent of the deaths among men and women 65 years of age and over. This was due to the great importance of heart disease and cancer and other malignant tumors, which together accounted for about 60 per cent of the mortality of the aged.

—HOMER L. HITT AND IRVING L. WEBBER.

The Social Effects of Agricultural Mechanization in Louisiana

The study of the social effects of agricultural mechanization in Louisiana has been continued. The data from the Census and other sources that were reported in the preceding Annual Report have

been supplemented with information obtained in a field survey of four sample areas within the state. These areas were selected by means of an index designed to measure the degree of mechanization in the various parishes. Interviews were held with both farm operators and non-operators. Although the field schedules are still in the process of analysis, some important findings have already been forthcoming.

One discovery is that farmers of the state are accepting mechanization with an even greater enthusiasm than had been suspected. The survey data show that even in the least mechanized areas of the state (including parishes in the North Louisiana Upland Areas and in the Cut-Over Areas) 31 per cent of the farm operators perform the majority of their work with power machines. There is, in fact, an actual "technological unemployment" in all areas as far as draft animals are concerned. In this connection, it is of significance that 95 per cent of the farmers who have had experience with mechanized equipment give evidence of being completely "sold" on it.

Several challenging questions have been posed since the recent advent of machines on southern fields. Many persons have speculated as to why farmers turned to mechanization in the first place. Such a query was posed to all interviewees in the operator class. Contrary to the belief of some individuals, farmers of the state do not cite a shortage of labor as the prime cause of their shift away from the long used "one-horse technology." Instead, they (51 per cent of the persons questioned) point to the more efficient utilization of the tractor and other powered equipment on the farm. Labor shortage has, however, been an important factor in the adoption of machines. This is witnessed by the fact that 19 per cent of the respondents mentioned this as the chief reason for their change. Another important motivating factor has been the economy of power tools as compared with hand labor. Eighteen per cent of the farmers interviewed named this factor as the most important influence in their decision. An additional 11 per cent stated that farm work was made easier with machines, and about one per cent could give no specific reason for changing from draft animals. Interestingly enough, the pattern of responses was similar in all areas.

Much speculation also has been done as to why certain farmers have not utilized technological improvements. The discovery that 39 per cent of the non-mechanized farm operators who were interviewed are planning to shift to machines as soon as possible is, therefore, an important one. The chief deterrent factor listed by this group was lack of the necessary capital. Among those farmers who are not mechanized and have no immediate plans in that direction, the chief reasons given are as follows: Farm too small (28 per cent), operator too old (26 per cent), lack of capital (23 per cent),

preference for animals (4 per cent), and other miscellaneous reasons (19 per cent).

Many additional items of interest to persons who are concerned with rural life are indicated by a cursory review of other material collected during the field survey. There is, to cite a few examples, evidence that mechanization is associated with age and education, that the farmers who have mechanized are more apt to have introduced new farm practices within recent years, that mechanization is associated with changes in workers' housing and pay, that mechanization means more commercialization, and that mechanized farmers enjoy more leisure time. All in all, a preliminary conclusion that the agricultural population is becoming more like the urban population seems justified.

—ALVIN L. BERTRAND.

Modifying Dental Attitudes Through Community Programs

Research concerning the attitudes of rural people has shown that dental care for children is not entirely a problem of professional manpower. It indicated that the attitudes of parents play a major role in the discrepancy between what children need and the dental service they actually receive. For some time, the State Department of Health has conducted dental clinics in local communities throughout the state in an attempt to make known to parents, teachers, and children the importance of proper care of teeth. This agency desired to test the procedures and techniques used in these clinics to determine their effectiveness in changing attitudes toward dental care for children. Therefore, the Department of Rural Sociology has been requested to conduct research directed toward this objective. The ultimate findings of this study will be used by the Dental Section as a guide in planning community dental programs for the future.

The method of investigation decided upon jointly by personnel of the Department of Rural Sociology and the Department of Health is that generally referred to as "projected experimental design." This procedure involves four steps: (1) Areas for study are to be selected and a survey made to determine existing attitudes toward dental care for children. (2) The personnel of the Dental Section of the Health Department are to conduct a clinic designed to bring about a change in the attitudes toward care of children's teeth. (3) Following this step, the areas are to be resurveyed at a date approximately one year after the first sampling to determine existing attitudes at that time. (4) A comparison of the results of the two surveys is to be made to determine what changes, if any, have come about in the attitudes examined.

The study is now in the second stage outlined above; that is, the Dental Section is carrying out its program in the selected study

areas. The first survey was completed this summer by personnel of the Department of Rural Sociology, and the data are now being tabulated and analyzed. The resurvey is scheduled for the summer of 1951.

The results of the original survey provide some interesting details concerning attitudes toward dental care for children. In all three communities studied, slightly more than 60 per cent of the persons interviewed are of the opinion that dental care for children is of more importance than similar care for adults. About the same proportion feel that care of the baby teeth is just as important as care of the permanent teeth. Approximately 15 per cent of the interviewees are of the opinion that an aching tooth is beyond repair and that the only remedy is extraction. Diet, neglect, and heredity are the most often mentioned ideas as to the cause of dental cavities among children. The majority of the interviewees report that the cost involved and negligence on the part of parents are the main reasons that people fail to take their children to dentists. In questioning school children in the study areas, it was found that teachers apparently are not concerned with the dental health of their pupils. Over 85 per cent of the students stated that their gums had never been examined by the teachers. In two of the three areas studied, 30 per cent of the pupils reported that they had never been treated by a dentist.

—PAUL H. PRICE.

Sugar Cane

Sugar Cane Test Fields

In the 1950 season, there was a total of 24 sugar cane variety experiments at eight locations in the Louisiana sugar cane belt. In spite of serious freeze conditions occurring Nov. 5, 12, and 25 and Dec. 7, all experiments were successfully completed by Dec. 18. Several of the plant cane tests harvested late in the season gave interesting comparative data on freeze effects on some of the commercial and unreleased varieties. This information will be presented with analyses and field results in the 1950 Sugar Cane Test Field report.

1950 Evaluation of Varieties (Averages of plant cane and stubble)—For each test field, the four highest ranking varieties in the order given performed best from a sugar per acre standpoint during the 1950 season.

CINCLARE (Mhoon very fine sandy loam)—C.P. Nos. 44-101, 43-47, 36-105, and 44-155. (Bowdre-Sharkey clays)—C.P. Nos. 44-101, 44-153 (unreleased), 45-184 (unreleased), and 44-155.

GLENWOOD (Mhoon very fine sandy loam)—C.P. Nos. 44-155, 44-101, 36-105, and 34-120.

RESERVE (Mhoon very fine sandy loam)—C.P. Nos. 43-47, 44-155, 36-105, and 44-101.

MEEKER (Yahola very fine sand)—C.P. Nos. 44-101, 36-13, 44-155, and 36-105.

SHIRLEY (Yahola very fine sandy loam)—C.P. Nos. 44-101, 43-47, 36-105, and 44-155.

CAFFERY (Baldwin silty clay loam)—C.P. Nos. 44-101, 43-47, 36-13, and F. 31-762.

BILLEAUD (Lintonia-Olivier silt loams)—C.P. Nos. 45-184 (unreleased), 36-13, 44-101, and 44-155.

YOUNGVILLE (Richland-Olivier silt loams)—C.P. Nos. 44-101, 43-47, 36-105, and Co. 290.

1950 Fall Planting—New experimental plantings were made at the eight locations Sept. 11 to Oct. 5. An average of seven commercial and twelve unreleased varieties were planted at each test field. All of the nine fields amounted to 31.35 acres, or an average of $3\frac{1}{2}$ acres per field. The following eight selected seedlings, C.P. Nos. 48-12, 48-103, 48-110, 48-116, 48-119, 48-120, and 48-126 and N. Co. 310 were planted on a small-plot introductory basis. Seed cane of these varieties was grown at the Louisiana State University Sugar Station.

Performance of Promising Varieties—C.P. 43-3—From the standpoint of averages of stubble results, this variety responded better than C.P. 36-105, at the Reserve, Shirley, and Meeker test fields. At the other five locations it ranked lower than C.P. 36-105.

C.P. 43-9—At Glenwood, Reserve, Shirley, Caffery, Billeaud, and Youngsville test fields, this variety outranked C.P. 36-105 in the stubble averages. It is consistently higher in field yield but lower in sucrose than C.P. 36-105.

C.P. 44-153—This is a vigorous growing cane with a low sucrose rating. It is definitely undesirable for the fertile light soils of the Mississippi River and Red River areas. Averages of stubble results indicate that C.P. 44-153 made a favorable showing by ranking second at each of the following places: Cinclare (Bowdre-Sharkey clays), Caffery, Billeaud, and Youngsville.

C.P. 44-154—Plant cane results indicate that it is a vigorous, high-tonnage cane with a low sucrose rating. Its best performances were at the following test fields: Cinclare (Bowdre-Sharkey clays), Glenwood, Reserve, Billeaud, and Youngsville.

C.P. 45-184—This is a vigorous growing cane of about the same type and appearance as C.P. 34-120. It performed best at the following locations: Cinclare (Bowdre-Sharkey clays), Shirley, Caffery, and Billeaud; while at the other five test fields it was outranked by C.P. 36-105.

—C. B. GOUAUX.

Veterinary Science

Control of Brucellosis in Swine

For over three years, we have been carrying on work on the eradication of Brucellosis in a swine herd. The methods of controlling this disease are well defined, and like the control of the disease in cattle, the success in a given enterprise depends upon two main factors. The first is to decide what plan is to be followed and the next is to do everything in a correct and complete fashion, not attempting to cut corners at any place. The herd on which this work was done was composed originally of some animals that carried very valuable pedigrees, so it was not advisable to sell out completely and start anew after slaughter of the entire herd followed by a period of time with no swine on the farm.

The plan used was briefly as follows. A regular testing program was instituted to furnish information that was most essential, in order to know where we were, where we were going, and where we were getting. Many reactor animals were sold directly to slaughter but no animals were sold for breeding purposes. Pigs from the sows in this herd were raised on clean ground and then were tested to see how complete the isolation program had been. No animals were allowed to come in to this herd unless on a clean agglutination test and from a herd certified to be free of this disease. Isolation was practiced and the few animals purchased were not allowed on the part of the farm where infected hogs had been in years past. The agglutination test was used and interpreted as suggested by those best informed on the disease as it occurs in swine.

At the time of preparation of this report, the herd had been free from Brucellosis for almost two years, as determined by the agglutination test and absence of any suspicious symptoms. Even though the herd had been free of the disease a year when the last report was made to the Experiment Station, it was felt that more time should be allowed before making the report, mainly because the farm concerned is in a very low area where isolation was thought to be very difficult, because of frequent heavy rains. The success of this program under the adverse factors of the type of terrain and the necessity for using the farm that was available instead of new ground or houses, shows very vividly that Brucellosis of swine can be eradicated and controlled by a program of testing and sanitation based on recognizing the disease for what it is and not attempting to cut corners at any place no matter what apparent expediency or excuse might arise.

—R. B. LANK AND W. T. OGLESBY.

Johne's Disease (Paratuberculosis)

Johne's disease or paratuberculosis is a chronic infectious disease of cattle, horses, swine, sheep, deer and goats. Although it may occur in any of these animals, it is of primary importance in cattle. The disease is characterized by either a constant or recurrent diarrhea accompanied by loss of weight, usually with the animal maintaining a fair appetite until death. It is caused by an acid-fast rod (bacterium), very similar in appearance to the organism of tuberculosis. On post-mortem examination the most characteristic finding is thickening and corrugation and areas of inflammation of the intestinal lining, especially in the back part of the small intestine, the first part of the large intestine, the blind gut (cecum) and the rectum.

The herd we were working with has been naturally infected since 1925. During the past three years the incidence of clinical cases of the disease has decreased and the number of positive reactors has dropped. One test of the entire herd was completed during the year with very few reactors being found. This low incidence of reactors is unexplainable at the present time. No clinical cases were seen during the year. Owing to the fact that very few reactors were found on the test, no comparative work was attempted with intradermal and intravenous tests for the development of a better diagnostic procedure.

Most emphasis was placed during the year on testing baby calves and young stock. Calves in individual pens were negative to all tests conducted, but when allowed on the ground they began to show some sensitization to the intradermal Johnin test. We are placing more emphasis on the fact that calves are infected early in life and that owing to the slowly progressing nature of the disease, the animals seldom exhibit symptoms until they are adults. With this as a background, we have moved several heifers, negative on all tests, to the branch Experiment Station at Homer, Louisiana, where supposedly no clinical cases have ever been present. We will test these animals periodically and observe closely for sensitization or development of symptoms. If these animals remain free, we will be more certain that infection takes place early in life and that sanitation in calf raising will be the main instrument in the control of the disease. Simultaneous with study of this group of animals, we will study others that have been allowed to run with an infected herd.

It is planned for the coming year to continue testing the calves and follow up with the animals that were put on clean ground at the Homer Station. We will again test the entire herd and if enough good reactors are found, carry out some comparative tests on intradermal and intravenous diagnostic methods in an effort to find a more effective diagnostic procedure. All of this work, as well

as past work done here, will be coordinated with the U.S.D.A., Bureau of Animal Industry Regional Laboratory at Auburn, Alabama.

—R. B. LANK AND W. T. OGLESBY.

Typhoid-Pullorum Complex

Comparative studies were continued on fowl typhoid and pullorum disease hoping to find a relatively simple field test which would serve to differentiate the two diseases. Studies were made specifically on the antigenic properties of cellular constituents of *Salmonella-gallinarum*, and also of metabolic products produced by this micro-organism when grown on several special media. Comparative studies on *Salmonella pullorum* also were made using the same procedures.

The results of this work have not been fruitful, as no method was found to clinically differentiate these infections in the fowl. These results serve to emphasize more strongly the importance of considering both infections and treating them as equals, rather than tending to ignore the *Salmonella gallinarum* infections from a legal standpoint under the National Poultry Improvement Plan.

This project was initially set up because reactors were being found in flocks that were pullorum clean and whose owners had bought only pullorum free birds. Bacteriological examinations on birds from these flocks, where the syndrome of fowl typhoid was lacking, always revealed *Salmonella pullorum*. Fowl typhoid, serious at times, surely is minor to pullorum disease and should not be allowed to deter the satisfactory execution of the Poultry Improvement Plan or of pullorum control in a flock not operating under the plan. In short, it is just as desirable to rid a flock of typhoid carriers as of pullorum carriers.

—CHARLES H. BRIDGES AND HELEN E. LEVY.

Gastro-Intestinal Parasites of Cattle

Previous experiments have shown that very severe symptoms and deaths are caused during the period of larval development and progression in the calf. Because of this fact, prevention of infection, either by proper sanitation or medication, of animals harboring the egg-producing adult worms will lead to the prevention of losses. Previous experiments have shown that $\frac{1}{2}$ and $1\frac{1}{2}$ grams of phenothiazine fed daily for 14 days was effective in stopping egg-production in pure infections of the *nodular worm*. Because of the different ways by which the drug might be administered, it seemed desirable to have additional information on the minimum amount and the minimum time of administration necessary to produce these results. Earlier results indicated that feeding $1\frac{1}{2}$ grams for a week, then

discontinuing for four weeks, then repeating, would be effective in stopping egg production.

Experiments during the past year indicate that as little as $\frac{1}{2}$ gram fed for 14 days stopped egg production, but was not effective when fed for 12 days. Extensive and thorough examinations for eggs showed that the calves getting $\frac{1}{2}$ gram of phenothiazine daily for 14 days were negative for eggs from 14 days to 14 weeks. When egg production is resumed it may reach sufficient proportions to be a source of serious infections in other animals, since nine calves were experimentally infected from one of these animals. From these experiments it would seem that $\frac{1}{2}$ to $1\frac{1}{2}$ grams of phenothiazine fed daily for two full weeks and discontinued for three or four weeks, then repeated, would be effective in controlling *nodular worm* infections.

Preliminary experiments in which $1\frac{1}{2}$ grams of phenothiazine were fed daily during the first two weeks of the larval period indicate that no protection was offered, since a relatively heavy infection resulted. When fed during the second two weeks of the larval period, no eggs were recovered in three experiments, but in a fourth, a very light infection resulted.

An experiment is being carried on in which cattle are given free access to a phenothiazine-salt mixture in the proportion of 1 to 10. The results to date indicate that there is a wide difference in the amount consumed by different individuals. They also indicate that widely different amounts are consumed at different time intervals. Similar results have been obtained in the case of the animals receiving pure salt. During approximately three months, three of the four animals receiving the phenothiazine-salt mixture consumed *less than $\frac{1}{2}$ gram* of phenothiazine daily, which is the minimum amount necessary to control nodular and hookworm infection. While as little as $\frac{1}{2}$ gram of the drug daily for two weeks (repeated again after a four-week lapse) should control the nodular worm, at least $\frac{1}{2}$ a gram is necessary *continuously* to control hookworm infections. These results to date indicate that free access to a 1 to 10 phenothiazine-salt mixture is not effective in controlling nodular worm and hookworm infections, this being due to the variations of intake based on the animal's desire for salt.

—R. L. MAYHEW AND CAROL T. ERNEST.

Substations

Fruit and Truck Station, Hammond

W. F. WILSON, JR., *Superintendent*

M. J. GIAMALVA, *Assistant Horticulturist*

Strawberry Varieties

In tests conducted for the past several years, the seedling L-27 has out-yielded all other varieties, with an average yield of 239 crates per acre for the past four years. Marion Bell has produced an average yield of 179 crates per acre and Klonmore 140 crates per acre. The 1950 season is the only year in which Klonmore produced better yields, 155 crates per acre, than Marion Bell, which produced 138 crates per acre. This difference was apparent early in the season as late frosts killed a much larger percentage of the fruit produced by Marion Bell. These three varieties have desirable market qualities. Marion Bell and Klonmore remain as the varieties best suited for this area. Plants in any quantity of the seedling L-27 are difficult to obtain as this seedling produces relatively few plants compared to the recommended standard varieties.

Fertilizer Test with Strawberries

During the seasons 1949 and 1950, on soils that have regularly been planted to strawberries with a green manure crop between strawberry crops, a test was conducted involving the application of 1,500 pounds per acre of the formulas 4-4-4, 4-8-4, 4-12-4, and 4-16-4. All the ratios showed significant increases in yields over the 4-4-4, but there were no great differences in yield for the other ratios over the 4-8-4. The formula 4-4-4 produced yields of 149 and 125 crates per acre in comparison with 160 and 137 crates per acre for the formula 4-8-4.

Chemical Weed Control in Strawberries

Results for three seasons (1948 through 1950) show that the number of weeds on the strawberry beds at the time of scraping and mulching can be reduced 40 per cent by a pre-setting spray of two pounds acid equivalent of 2,4-D per acre or four pounds of a di-nitro per acre.

This reduction in number of weeds was not as important as the reduction in the size of the weeds on the sprayed areas which

made it possible to reduce the time of scraping by 60 per cent. This control of weeds has been accomplished without any reduction in the yields of strawberries.

Tests comparing scraping and not scraping of the sprayed areas on which the weeds were controlled have shown that scraping is necessary, as yields were materially reduced when the beds were mulched without scraping.

The control of weeds and grasses in the middles between the strawberry rows has been very effective from the use of two pounds acid equivalent of 2,4-D per acre plus ten pounds of T.C.A. applied at the time of scraping with the plants still under the straw. No hoeing of the middles was necessary during the harvest season.

—W. F. WILSON, JR., AND E. R. STAMPER.

Strawberry Top-Dressing Tests

Top-dressing tests were conducted through the seasons of 1945 to 1950. During the six-year period results were very variable, but from the averages best yields have been obtained from the application of 750 pounds of the formula 4-12-4 in the beds before planting and 750 pounds as a top-dressing at the time of scraping and mulching. This treatment produced 243 crates per acre in comparison with 214 crates per acre when the 1,500 pounds of 4-12-4 was applied under the crop prior to setting. During the same period, application of 500 pounds under and 500 pounds as a top-dressing produced an average yield of 231 crates per acre.

1950 Fall Cucumber Variety Test

In the fall of 1950 the highest yielding cucumber variety, with a total crop of 521 bushels per acre, was Burpee's Hybrid. A yield of 464 bushels per acre was obtained from Marketer, which is a variety better adapted for commercial use because of its favorable dark green color. This cucumber produces a fruit about 7½ inches long, 2 inches in diameter and has an average weight of .68 pound.

Palmetto, a new variety which has received quite a bit of attention, is resistant to mildew and produces constant yields; however, it is a blunt-end cucumber and many of the fruits have holes at the points of seed attachment, which makes it objectionable as a market cucumber. In contrast, the Marketer variety has fruits with wedged ends and is free of this objectionable defect.

Other new varieties were included in a Regional variety test, some of which were resistant to mildew. Two of these varieties, S.C. 10 and S.C. 11, showed promise, producing yields of 624 and 578 bushels per acre, respectively, of well-colored fruits of excellent marketable shape in comparison with 461 bushels per acre produced by Marketer when no disease control was practiced.

When diseases were controlled, Marketer produced 687 bushels per acre; S.C. 10, 565 bushels per acre; and S.C. 11, 533 bushels per acre.

—W. F. WILSON, JR., AND M. J. GIAMALVA.

1950 Fall Cucumber Fertilizer Test

In the fall of 1950, which was a very good year for producing cucumbers, nine treatments were used involving variations in the combinations of the three major elements from 32 to 96 pounds of each. It was interesting to note that in a year in which yields were so high the application of 32 pounds N, 96 pounds P, and 32 pounds K produced significantly higher yields than other treatments. Yields were depressed by the addition of nitrogen above the minimum amount of 32 pounds per acre, and increased by the addition of phosphorus above 64 pounds per acre.

Pole Bean Variety Test

In the fall of 1950 highest yields were obtained from Canfreezer, a new variety developed by the L.S.U. Experiment Station, and McCaslan. They produced 287 and 277 bushels, respectively, compared to 227 bushels for Kentucky Wonder. Highest early yields as measured by the first three pickings were from McCaslan. It produced 130 bushels per acre compared to Canfreezer's 59 bushels for that period.

—W. F. WILSON, JR., J. F. FONTENOT, AND M. J. GIAMALVA.

Cucumber Fungicide Tests

Several fungicides were tested on the fall cucumber crop for the control of the two principal foliage diseases, downy mildew and anthracnose. The fungicides were tested as dusts formulated to contain 20 per cent cryolite and 1 per cent nicotine using Black Leaf Dry Concentrate as the nicotine source. Since there was very little rainfall during the period of the test, anthracnose was a very minor disease and the fungicides could not be evaluated for anthracnose control. Although visual observations indicated that downy mildew was very effectively controlled by all treatments, downy mildew was actually rather light during the 1950 test period for this section of the state. Dusts containing copper fungicides resulted in considerable injury characterized by chlorotic leaves. Each of the fungicides tested gave exceptionally high yields with no significant differences between treatments.

Although anthracnose had previously been found to be a rather sporadic disease, the 1950 tests very clearly demonstrated that anthracnose does not spread and cause serious damage during seasons of low rainfall. Previous tests showed that anthracnose caused seri-

ous damage when favored by periods of rainy weather and that some of the new organic fungicides gave better control than the copper materials. On the basis of the 1950 tests and those of previous years, the preferred fungicides for control of both anthracnose and downy mildew included Dithane Z-78, Fermate and Parzate. A new fungicide, Orthocide 406, was promising. These organic fungicides are recommended in preference to the copper fungicides as "insurance" against the sporadic destructiveness of anthracnose.

—J. G. ATKINS, W. F. WILSON, AND M. J. GIALMALVA.

North Louisiana Experiment Station, Calhoun

RALPH S. WOODWARD, *Superintendent*

JAMES L. HEATH, JR., *Research Associate in Animal Industry*

JOHN C. TAYLOR, *Research Associate in Horticulture*

The program of research work on this Substation continued as in 1949. In addition to the research program, the work of improving the Station facilities was continued, and while receiving no special appropriation for the purpose, a new office building, a residence for an additional technical man, two beef feeding barns, a calf barn, and a large dairy (hay and loafing) barn, were constructed with day labor. In addition to the new buildings the farm shop and tractor shed was enlarged to house all tractors, trucks, and rubber tired implements and an old hay loft was remodeled into a spacious auditorium.

Agronomy Research

Corn Production Affected by Insect Damage—The test plots of corn, with few exceptions, were damaged by the sugar cane beetle or rough headed corn stalk borer, *Ligyris rugiceps*. The attack of this insect was so severe in the corn plots that the results of the tests involved are of little value. The damage it causes by cutting into the young seedling below the soil surface depends to a great extent on the planting date and consequent early development of the corn plant. If the insect attacks the plant before it attains sufficient size it will girdle the young seedling, either killing it outright or so badly damaging it that the growth is materially retarded. Its feeding on older, larger plants does not cause as much damage, but the growth is usually retarded. It has been observed that mid-to-late March plantings usually escape serious damage. This early planting is not always feasible since rainfall in late February and early March determines to a great extent the amount of field preparation that can be made, and the earliness of planting.

In 1950 an experiment, planned by Mr. E. H. Floyd of the

Entomology Research Department, using chlordane as a control for this pest was begun. The results of this first year are of no specific importance since the check plots (receiving no treatment) produced the third highest yield of corn and the second best stand, with 97 per cent of all hills surviving. The best treatment for stand and yield was a 10 per cent chlordane emulsion seed treatment (prior to planting) which produced a yield of 50.6 bushels and a 99 per cent stand. The use of chlordane mixed with the fertilizer proved not as effective as seed treatment. In most treated plots the use of chlordane seemed to upset the nutritive balance of the plants, which was shown as a purple coloring in some of the leaves. However, it is thought that this was not sufficient to materially affect the growth.

Corn Spacing Studies—In 1950 an old spacing test of several years duration was changed to include various plant populations per acre and different methods of obtaining them. The results are highly inconclusive owing mainly to the attack of the above mentioned insect, most especially in the closely spaced plantings. However they indicate that several plants per hill, widely spaced, will give yields as high as those obtained from closely spaced, single-plant hills.

In an older experiment designed to check the influence of both rate of fertility and plant population, the results are similar to those of past years. The treatments were changed in 1950, eliminating a 30-inch spacing which has always resulted in lower yields and including a 12-inch spacing. Fertilizer treatments remained the same. Generally the 12-inch spacing resulted in higher yields under all fertilizer treatments than did the 18- or 24-inch plantings. The differences, however, were small and probably of little significance between the 12- and 18-inch spacing but were more so between the 12- and 24-inch. 1950 was a year of unusually well distributed rainfall and this was probably a main factor in the performance of the closer planted corn.

It was interesting to note that even under good moisture conditions and heavy plant population the yield from 120 pounds of nitrogen per acre was less than from 90 pounds—a fact that has shown up each year of the test. It seems that there may be a maximum point of fertility beyond which yields do not greatly increase even under optimum conditions.

Corn-Soybean Experiment—The second year's results with this test brought out some interesting, if not conclusive, facts. The plots annually planted to corn alone produced 68 bushels per acre in 1950 as compared to 60 bushels in 1949, a gain of eight bushels, while the plot with corn alone following cotton in a two-year rotation produced 84.6 bushels per acre. The plot annually planted to corn and beans in alternate hills produced 67.2 bushels per acre in 1950 as

compared to 43.7 bushels in 1949, a gain of 23.5 bushels. The plots with corn and beans in alternate rows produced 50.3 bushels in 1950 as compared to 27.4 bushels per acre in 1949, a gain of 22.9 bushels. The cotton plots followed the trend of a general increase. Cotton following corn and beans in alternate hills produced 2,061.8 pounds of seed cotton per acre, while cotton following corn and beans in alternate rows produced 2,136.7 pounds. This, compared with a yield of 1,705.4 pounds from cotton alone annually, reflects a substantial gain when the high price of cotton is considered.

These results should not be considered as conclusive, since it will require at least two or more years to get the full significance of the rotational nature of the experiment. They are listed merely to show the trend of the results.

Corn Variety Trial—The most significant fact to come out of this experiment was the fall of La. 468 from among the top three or four varieties to fifteenth place. This marks an all-time low for the variety at this Station. The Dixie varieties were at the top with Dixie 22 leading the test, followed by Dixie 17, Dixie 18 and Dixie 11 with La. 0009 in third place. The variety recommendation, however, cannot change on just one year's results and still must be governed by the soundness of the ear and other factors. The two leading varieties in 1950, in both yield and soundness of ear, were La. 0009 with 53.4 bushels and 82 per cent sound ears, and Dixie 18 with 53.2 bushels and 83 per cent sound ears.

Cotton Variety Trial—All varieties in the test yielded so well that differences were hardly significant. All varieties produced better than a bale per acre, with top production going to Smith 78 with 659 pounds of lint per acre. Stoneville 2B produced 656 pounds, Deltapine 15, 643 pounds, and Coker 100 Staple, 621 pounds per acre.

Pasture Studies

This phase of the program has caused quite a bit of interest among hill farmers. The work is just getting under way on the Station proper and much remains to be done, both on fertilization and crops.

Sand Hill Pasture—This pasture produced beyond all expectations in 1950. After tentative trials reseeding crimson clover was sown in the fall of 1949 following application of 1,000 pounds dolomitic lime and 100 pounds 20 per cent superphosphate per acre. (Prior treatment was described in last year's report.) Approximately four and one-half (4½) acres of hillside and adjacent low level area were sown to the crimson while the remaining area was sown to subterranean clover. The seed of subterranean were planted a month late owing to a shipping error and thus furnished no graz-

ing until after the crimson had seeded. The entire herd of registered Devon cattle was turned on the field February 17 and allowed to graze the clover to the ground. They were taken off on March 10 and held in another pasture with a little feed until clover had made sufficient regrowth. The group was again turned on the field on March 28 and allowed to remain throughout the seeding period and until all edible forage was exhausted. Final weights were taken on April 28, when observation of the herd indicated that they were grazing other forage (subterranean clover) than the crimson.



Part of the Devon herd at the Calhoun station. The sand hill in the background is where crimson clover produced 388 pounds of beef per acre from seven weeks of grazing in 1950.

The total gain for the first period was 980 pounds and for the second period 765 pounds, for a total gain of 1,745 pounds. This was a gain of 388 pounds per acre over the entire period. The cost of this pasture was calculated at \$12.50 per acre exclusive of labor. At a nominal price of 20 cents per pound, the profit per acre from crimson clover alone on this once abandoned hillside was \$65.10.

New Pasture Development Work—An area of 37 acres that was used as an overflow pasture for the dairy was divided into two 10-acre areas and a 17-acre area. This land is characterized by a series of knolls some 18 inches to 24 inches higher than the surrounding land. The lower sections are generally wet and waterlogged and heavily sodded to carpet grass and some wild Dallis. The knolls were grown

up to broom sedge, other weeds and briars and furnished very little in the way of forage.

With no attempt to level or correct the poor drainage the entire area was limed with 1,000 pounds of dolomitic lime per acre and fertilized with 300 pounds 3-12-12 per acre as a fall treatment. Most of the knolls were deeply broken, to kill the briars and sprouts, and thoroughly disked prior to planting.

Fescue was sown to the knolls in the entire 37 acres. On the east 10-acre plot crimson clover was sown, on the center 10 acres subterranean clover was sown, and on the 17 acres both crimson and subterranean were planted on the knolls in the area. White Dutch clover was sown to the carpet grass area in the entire 37 acres. Good stands were obtained in all but the low lying carpet grass areas where a spotted stand of white Dutch resulted.

Under competition with crimson the fescue made only a little growth but survived. It did some better with subterranean but still failed to produce appreciable forage. Similar results were experienced in combination with the two clovers.

The crimson-subterranean mixture proved to be outstanding since the tall rank growth of crimson failed to shade out the subterranean underneath. Both progressed well together and when the crimson had seeded, the subterranean provided three to four weeks additional forage.

Both of these clovers merit consideration in North Louisiana, either as separately planted crops or in combination.

In order to check the productivity of the pastures a herd of 13 adult cattle and six baby calves were turned on the crimson-fescue area on March 10 and weighed out on April 4. They produced 485 pounds gain. The same group with three additional calves were put back on April 28 and left until May 4, producing 785 pounds gain or a total of 1,270 pounds, or 127 pounds per acre, for the two periods.

On May 15 the group was turned on the subterranean-fescue area and weighed off on June 7. Gain during the period was 1,040 pounds.

The cattle used were Africander-Angus hybrids. After completion of grazing trials the herd was allowed free run of the 20 acres mentioned and an additional 15-acre area. Winter feeding was started on Dec. 1.

The fescue grass survived and made a fair growth during the fall of 1950. However, it is doubtful whether it will prove to be of much value as a grazing crop on the relatively poor soils in this area unless additional fertilizer is used, over and above the requirements for the clover. Work with the fescue must be continued before a recommendation can be made.

—RALPH S. WOODWARD.

Horticulture

Fertilizers for Sweet Potatoes—In 1950 best results were obtained from the use of a 3-4-4 ratio (30-40-40), as compared to the 1-2-2 ratio (20-40-40 to 30-60-60) during the three preceding seasons. The probable explanation for this was the excessive amount of rainfall throughout the season, creating what is known as a "nitrogen" growing season. After four years' results it seems that a recommendation of 20-30 pounds of elemental nitrogen, 40-60 pounds of phosphate, and 40-60 pounds of potash per acre for sweet potato production in the hill section of North Louisiana can be made. This amount may be supplied by using 400-600 pounds of 5-10-10 or 500-750 pounds of 4-8-8 per acre.

Watermelon Research—The work of several years of watermelon breeding has resulted in the development of a high quality, wilt resistant, Black Diamond type seedling. The rind does not have as good shipping qualities as the commercial Black Diamond but should be good enough to stand trucking, which is the method by which most melons are transported to market in this area. There are several pounds of seed from this seedling available now and plans are to increase this amount considerably within the next year. Work is already under way to try to improve the shipping qualities of this melon through crossing with other varieties.

The Black Diamond variety is recommended for commercial production in North Louisiana.

Tomato Fertilizers—The 1949-50 season completed three years of work with tomato fertilizers. Each season the most economical yields were obtained with the use of a fertilizer mixture containing 80 pounds of elemental nitrogen, 120-160 pounds of phosphate, and 80 pounds of potash. The 80-120-80 treatment produced a total yield of 27,075.6 pounds per acre, with 21,810.9 pounds of this yield being marketable during the 1950 season. Based on these three-year results an 80-120-80 mixture is recommended for tomato production in North Louisiana. This should be applied by using 1,200 pounds of 4-10-7 fertilizer before or at planting time and side-dressing with 100 pounds of nitrate of soda two weeks after transplanting and with another 100 pounds of nitrate of soda, or its equivalent, at the time clusters are formed. If a 4-10-7 mixture is not available 1,300 pounds of 4-8-8 or 1,200 pounds of 5-10-10 per acre may be used.

Tomato Varieties—This planting consisted of 13 varieties. The Rutgers produced the highest marketable yield of all commercial varieties in the test, with a production of 14,943.9 pounds. Louisiana Hybrid 187 produced a marketable yield of 17,363.7 pounds for the highest yield of any variety in the test. The Rutgers, Marglobe, and Gulf State varieties are recommended for tomato production in North Louisiana.

Irish Potato Varieties—Six varieties of the Irish potato were grown in this test. Two Louisiana introductions, the LaSoda and DeSoto, led in production of marketable potatoes with yields of 135.2 and 137.9 bushels per acre, respectively. Both are red varieties. The Kennebec variety produced a marketable yield of 109.0 bushels per acre to lead the white varieties. If certified seed are available the above varieties should be grown; otherwise the Triumph and Katahdin varieties should be grown.

Onion and Shallot Work—A small plot of the Creole onion was grown from bulbs in order to see if it is practical to produce Creole onion seed in North Louisiana. Even though the plants made a good yield of seed, they were produced during the mildest winter this area has had in many years, and this was not considered a representative test. The planting is being repeated during the 1950-51 season.

There has been some controversy as to whether it is profitable to transplant shallots. Yield records were taken on both transplanted and non-transplanted. The transplanted plots produced 2,304 pounds, while the non-transplanted produced 4,080 pounds of dry shallot bulbs per acre. Several hundred pounds of shallot bulbs were produced and sold to a grower in South Louisiana for production of green shallots.

Sweet Potato Varieties—Ten varieties and seedlings were included in this test. The highest yields were produced by L-240 and L-250 with a production of 313.0 and 330.6 bushels of marketable potatoes, respectively. Unit 1 produced 185.2 bushels per acre and was closely followed by the wilt resistant seedling L-241, which gave a yield of 172.7 bushels per acre. The Unit 1 and L-241 are recommended for sweet potato production in North Louisiana. Even though L-240 and L-250 make tremendous yields, they are both lacking in other desired qualities.

Cooperative Sweet Potato Fertilizer Test—This test is conducted in most sections of Louisiana by the various stations and involves treatments different from those in our own test. Best yields were obtained by the use of 600 pounds of 6-8-8, 8-8-12, and 8-12-8 per acre.

Peach Varieties—Owing to the very mild winter which prevailed during 1949-50, many of the 24 varieties in this planting did not receive sufficient cold to properly develop the fruit and leaf buds. As a result, only 6 of the 24 varieties produced a near normal crop. Sunhigh, False Fireglow, and Burbank Elberta produced normal crops, while Golden Jubilee, Summercrest, and Georgia Belle were slightly less than normal. The regular Elberta and Dixiegem produced practically no fruit at all, while most of the remaining varieties did not produce any fruit. Recommended varieties are:

Dixiegem, Sunhigh, Triogem, Southland, Burbank Elberta, Sullivan's Early Elberta, and Elberta for commercial production. Golden Jubilee is good for home orchards along with the recommended commercial varieties.

Lesser Peach Borer Control Studies—For the past several years the lesser peach borer has probably inflicted more damage on older peach trees, in North Louisiana, than any other insect. During this time the peach growers have been following control recommendations which were perfected in one of the northern states where they probably have only one generation of the insect each season. It is believed by many that in this area several generations of the insect are produced each year, and that during mild winters such as 1948-49 and 1949-50 this pest is active most of the 12 months. As a result growers have been getting practically no control and a very heavy buildup of the insect in the older orchards. Even though DDT is an excellent control for the main borer it seems to have no effect on the lesser borer. During the summer of 1950 several insecticides were tried at this station for control of the insect with no favorable results until the month of September. At this time a mixture of emulsified 16 per cent liquid parathion, water, and dormant oil was used. This combination was used at six different ratios varying from 1.25 ounces of parathion in four gallons of water and one gallon of dormant oil to the strongest mixture of 3.50 ounces of parathion in four gallons of water and one gallon of dormant oil. Even though the latter treatment gave excellent results in most cases, further studies show a mixture of 10 ounces of parathion in eight gallons of water and two gallons of dormant oil to be much more effective. This latter mixture has been used in two large commercial orchards as well as the station orchard, with much more favorable results than any other treatment used to date. It was applied by the use of a small shoulder sprayer or by applying the material on and around the wound with a paint brush. The latter method requires less material. It has been observed by all concerned that this material seems to promote tissue growth and greatly accelerates healing around the wounds caused by the borer action. No damage to trees has been observed in any case. It is also evident that the treatment gives better control under certain climatic conditions than others, and is probably influenced by temperature and humidity at the time of application and during the 72 hours following treatment.

This treatment is not perfected by any means. Much work is needed toward determining the life history and number of generations this insect produces in North Louisiana, in order to determine the proper time and frequency of applying the insecticide.

CAUTION: *Parathion is very toxic and should not be used by any person until he is thoroughly familiar with the precautions to take in handling.*

(Due credit should be given Mr. Summerral of Ruston and Mr. Stormont of Bastrop for conducting a large portion of these studies in their own orchards, and to Mr. Harris of the Cotton States Chemical Co. for supplying the materials along with very helpful advice.)

—JOHN C. TAYLOR AND RALPH S. WOODWARD.

Poultry

Beltsville Small White Turkeys—The “family size” Beltsville Small White breed of turkeys becomes more popular each year with the average family in Monroe and Baton Rouge market areas, although there is a good demand in both areas for the large, broad breasted breed of turkeys.

The Beltsville Small White turkeys grew and utilized their feed well again this year, although the poults were started two weeks too early for the Thanksgiving market. This breed, according to three years' results, should be sold from 24 to 28 weeks of age to get benefit of maximum utilization of feed.

The livability of the Beltsville Small White has been exceptionally good for the three years grown. Mortality and culling for the first four weeks of 1948 was 5.3 per cent of the 227 poults started in brooders; in 1949 the loss was 4.0 per cent of 174, and in 1950, 12.0 per cent of 233 started in brooders. Mortality on the range



Turkey shelter and protected outside feeder (in background) as used for turkeys on range from 8 or 10 weeks to 24 or 28 weeks of age.

(1950) was 3.4 per cent of the 205 for the 20 weeks on range. Total mortality, day old to 28 weeks, was 15.0 per cent of the 233 poults started this year (1950).

When the turkeys were eight weeks of age they were divided into three groups of 63, 63 and 68 and put on separate summer ranges. The three groups received growing mash, corn and oats (free choice). The turkeys on Range 1 had a native grass pasture, consisting mostly of Bermuda grass. Those on Range 2 had soybeans and cowpeas to graze until early summer, when the beans and peas were clipped, as they got too "stemmy"; a good growth of Bermuda grass followed and was grazed until frost in November. Group 3 grazed Sudan until early summer, when the Sudan was clipped; Bermuda grass furnished plenty of grazing through October. The turkeys on the soybeans and cowpeas plot made 18 cents per bird more profit than the turkeys on native pasture, and those on the



On this hillside range native grass has come in to replace the mixture of soybeans and cowpeas used for grazing earlier in the season at the North Louisiana Experiment Station. One of three lots of Beltsville Small Whites grown experimentally in 1950.

Sudan plot made 13 cents more profit than the ones on the Bermuda plot.

The turkeys on Range 1 consumed 5.52 pounds of feed to produce one pound of turkey. The average weight was 13.7 pounds per turkey. On Range 2, 5.34 pounds of feed were used to produce one pound of turkey, and the turkeys averaged 14.3 pounds. The group on Range 3 required 5.43 pounds of feed to produce one pound of turkey, and the turkeys averaged 13.7 pounds each. In 1948 it required 4.8 pounds of feed to produce one pound of turkey, in 1949, 5.3 pounds and in 1950, 5.4 pounds. On Range 1 the feed cost per

turkey was \$3.09 and the margin of income over the cost of the feed and of the poults was \$1.50 per bird. On Range 2 the cost of feed was \$3.14 and income over cost was \$1.68 per turkey. In Group 3 the cost of feed was \$3.06 and income over cost was \$1.53.

Twenty turkeys from each of the three groups (10 males and 10 females) were trucked to Baton Rouge to be graded and dressed

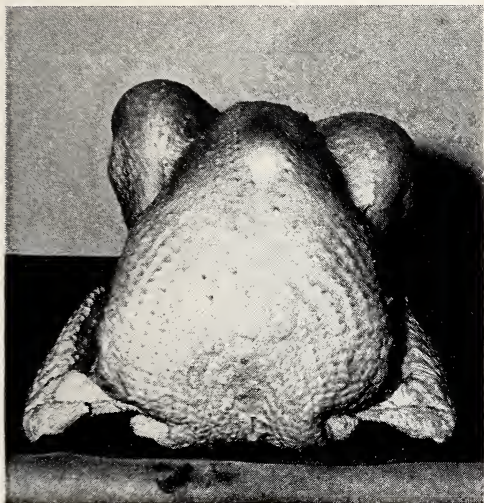
to measure the difference, if any, in the three groups at 29½ weeks of age for Thanksgiving market. The drawn weights as per cent of Baton Rouge live weight varied from 77.8 per cent to 80.4 per cent, with little difference for the two sexes. All of the turkeys graded A in fleshing and finish. The per cent of shipping loss from Calhoun to Baton Rouge (by truck) ranged from 3.0 per cent to 4.8 per cent, with the females losing slightly less weight on a percentage basis.

Three years of experience with the Beltsville Small White turkeys has proved that it is one of the

best breeds for the producer who sells primarily to householders and to poultry markets that specialize in the "family size" turkey.

—J. L. HEATH, JR., C. W. UPP, B. A. TOWER,

AND RALPH S. WOODWARD.



This Beltsville Small White tom typifies the desirable qualities of this breed as produced at the North Louisiana Experiment Station.

Hens Versus Pullets—The purpose of the experiment (hens versus pullets) is to determine the relative profit that may be expected from old hens as compared to pullets in the first year of production. In the first year (1949-50) the margin of profit was in favor of the pullet flock, as the net income was \$1.60 per pullet while the hen flock had a net deficit of \$1.06 per hen.

Two pens of New Hampshire layers, one containing 100 pullets and the other containing 103 old hens, were housed in separate pens and given the same diet of laying mash and grain fed ad libitum. Alternated outdoor ranges were available with winter, spring and summer green crops.

The pullets (over a period of 10 months) each consumed 40.2 pounds of mash, 38.7 pounds of corn, and 14.0 pounds of oats, or a total consumption of 93.2 pounds, or 9.3 pounds per month. The

average consumption of feed (over a period of 12 months) for the hens was 38.2 pounds of mash, 44.0 pounds of corn, and 17.5 pounds of oats, totaling 99.7 pounds, or 8.3 pounds per month.

The pullets reached their highest production during October through March, as expected. After December there was a gradual decline in production until the experiment ended. The hens reached their highest production during March, April and May. After this there was a sharp decline in production until the experiment ended.

The fertility for both the pullets and old hens was good. However, the eggs of the pullets hatched much better—92.5 per cent of all eggs set, while 78.1 per cent of those from the old hens hatched.

Chicks were hatched and grown from the hens and from the pullets. The mortality and cull chicks from the two flocks were about equal.

The pullets averaged 172 eggs valued at \$5.73, while the feed cost per bird was \$3.63. The old hens averaged 113 eggs valued at \$3.78, while the feed cost per bird was \$3.87. When, in addition to income from eggs, the market value of the pullets and of the cull hens was added to the respective pens and the cost of reproducing each flock was charged against the respective pens, the net income was 89 cents per pullet and a net deficit of 14 cents per old hen. The net income for the pullets last year (1949-50) was \$1.60 each as compared to 89 cents this year. The decrease in net income is due chiefly to a decrease in return from the fryers and to the increase in feed consumption. The pullets were ranged through 28 weeks this year as compared to 24 weeks last year.

—J. L. HEATH, JR., H. E. HATHAWAY, C. W. UPP,
AND RALPH S. WOODWARD.

Livestock

Beef Cattle—Of the 12 Red Africander X Angus cows, obtained from the U.S.D.A. Animal Breeding Laboratory, Jeanerette, Louisiana, 11 calved during the period Jan. 18, 1950, through Oct. 18, 1950. Seven of the calves were males and four females. All of the calves were weighed at about five days of age and the average weight per calf was 70 pounds. At five months of age nine of the calves averaged 316.6 pounds. The growth of the Africander X Angus calves compares favorably with that of the Devon and other beef breeds of this section that depend entirely on pastures for feed during spring and summer. To obtain additional information about the Africander X Angus cross, five of the males, born this spring, were trucked to L.S.U. to be used in a feeding experiment. At the end of the feeding experiment the steers will be butchered and a carcass study made of each animal.

A purebred Devon bull was bred to the Africander X Angus cows and an Africander X Angus bull was bred to the Devon cows,

and growth records will be obtained on the calves from the two crosses. The calves (Africander X Angus X Devon) will be compared to purebred Devon calves and the Africander X Angus calves.

The Devon herd is to be maintained as a purebred herd and increased by keeping all female calves. Growth and development records will be kept on the Devon herd as a comparison with the calves of the crosses and other beef breeds of cattle.

All of the cattle will be used to graze and check the productivity of the pastures at the Station.

—J. L. HEATH, JR., AND RALPH S. WOODWARD.

Hogging Off Crops—The “hogging off” program was started in 1943 and during this time corn, corn and soybeans, sweet potatoes and sweet corn have been used to finish spring pigs for the market.

In 1950 the spring pigs and sows grazed oats and alfalfa (interplanted) until July 10. On July 10, 22 pigs averaging 83.6 pounds were put on one acre of Gulf Coast sweet corn. In 14 days (July 10-24) the sweet corn produced 555 pounds of pork gain. On July 24 all of the pigs were put on one and one-half acres of Missouri Hybrid 313 producing 77 bushels per acre. The pigs' average weight was 108 pounds. In 22 days (July 24-Aug. 14) the pigs made a pork gain of 695 pounds.

A producer who is raising his own feeder pigs, or a feeder pig producer, may well consider the use of sweet corn, or Missouri 313 hybrid, to put a quick, economical gain on his pigs. Two years' work with hybrid sweet corn as an early grazing crop has proved highly satisfactory.

The pigs were dry lot fed from Aug. 14 to Aug. 30 owing to late maturity of field corn. The group was divided into two lots containing 11 pigs. One lot (averaging 139 pounds) was put on two acres of Dixie 11 hybrid field corn, and the second group (averaging 123 pounds) was put on Dixie 11 and Pelican soybeans interplanted. The group grazing corn made a pork gain of 725 pounds on two acres producing 61.6 bushels per acre. The group grazing corn and soybeans made a pork gain of 720 pounds on two acres producing 60.1 bushels per acre.

In 1951 the swine program will be changed from merely a “hogging off” program to include a study of production and management practices and a comparison of two swine breeding systems.

—J. L. HEATH, JR., C. B. SINGLETARY, AND RALPH S. WOODWARD.

North Louisiana Hill Farm Experiment Station, Homer

DAWSON M. JOHNS, *Superintendent*

LEVERNON BEAUBOUF, *Assistant Agronomist*

ROBERT E. WRIGHT, *Assistant Horticulturist*

E. E. HODGKINS, *Research Associate in Dairying*

The addition of physical facilities and the improvement of such has been continued as a part of the program of work which has been conducted at this station during the past year. Additions to facilities include one dairy bull pen and breeding chute, two dairy heifer feeding sheds, improved watering facilities for the dairy and beef cattle projects, the completion of two farm ponds, the erection of a beef cattle feeding shed, corral quarters, and scales for weighing cattle, scales for weighing hogs, 10 poultry range shelters, fencing of a nine-acre poultry range area, the clearing of approximately 100 acres of land for open pasture and tilled crops, extensive road improvement, and several important items of farm machinery.

Herds of 17 grade beef cattle, 22 registered Jersey cattle, and 15 additional Brown Swiss cattle have been added to the livestock programs of work. The cattle were acquired largely through grants and loans from the Bureau of Dairying, U.S. Department of Agriculture, and the University Departments of Dairying and Animal Industry.

A brief report of the research work follows.

Cotton Variety Tests

Data on the comparative yield, lint percentage, staple length, and boll size were collected on 27 different varieties and strains which were of local interest. Fox, Plains, Coker 100 Staple, Miller 610, Empire, Stonewilt, and Deltapine 15 led in the production of lint cotton in the commercial test, and Empire, Stoneville 5A-3202, Hybrid 56-4-M, Bobshaw 1-A, and Deltapine 15-51 were the top yielders in the new strains test. The staple length of these varieties ranged from 1 inch to 1-5/32 inches; the lint ranged from 39 to 43 per cent; and the boll size ranged from 67 to 86 per pound.

—D. M. JOHNS AND F. W. SELF.

Cotton Insect Control

The Economic Importance of the Tobacco Thrips as a Cotton Pest—Six commercial varieties of cotton were planted in a replicated test and one-half of the plots represented by each variety were sprayed in the seedling stage with toxaphene at the rate of one



Top picture: Cotton which received no insecticidal protection produced 404 pounds of seed cotton per acre at the North Louisiana Hill Farm Station, Homer, in 1950. Bottom picture: Cotton which received 12 applications of insecticide produced 1,272 pounds of seed cotton per acre and an average return of 72 pounds of seed cotton per application of insecticide.

pound of the technical material per acre. Plant height measurements early in the season indicated a benefit from the spray, but measurements which were taken later in the season showed that the plants recovered from any early damage which may have been caused by the thrips, *Frankliniella fusca* (Hinds).

—D. M. JOHNS AND L. D. NEWSOM.

Time of Beginning Insecticidal Control of Cotton Insect Pests—

No measurable benefits were gained from two presquare applications of insecticide which were applied for the control of thrips and to reduce the subsequent population build-up of boll weevils.

After fruiting began, the following three schedules of timing applications for boll weevil and aphid control were used: (1) Beginning with 25 per cent infestation and continuing until late August. (2) Beginning at the same time, but discontinuing applications during the first week in August. (3) Beginning applications during early August and continuing throughout the month. Alternate applications of 2 and 1 per cent benzene hexachloride in calcium arsenate were applied, and an average increase in yield of about 70 pounds of seed cotton per acre was obtained from each application of poison, irrespective of the date of beginning and ending the dusting applications.

—D. M. JOHNS AND L. D. NEWSOM.

Cotton Fertilizer Tests

Sodium as a Substitute for Potassium in the Nutrition of the Cotton Plant—Fertilizers which included different amounts and sources of sodium and varying amounts of potassium and a uniform amount of nitrogen and phosphorus were applied to cotton. Increased yields were obtained from the use of sodium applied with and without the presence of potassium in the fertilizers used. The results have varied, but, in general, support the conclusion that sodium may substitute for potassium to a high degree in the nutrition of the cotton plant or that potassium is used more efficiently by the plant in the presence of a more adequate supply of sodium than was contained in the soil on which the experiment was conducted. —D. M. JOHNS, M. B. STURGIS, AND J. G. MARSHALL.

Sources of Nitrogen Test—Side-dressing applications of 32 pounds of nitrogen per acre from potash-nitrate, nitrate of soda, and ammonium nitrate were made following an application of 300 pounds of an 8-8-8 fertilizer per acre before planting. The following respective yields of seed cotton were produced: 1101, 1200, and 1232 pounds per acre.

—D. M. JOHNS.

Minor Elements Benefits from Lignite and the Effects of Soluble Aluminum in Mixed Fertilizers—The experiment included 15 new mixed fertilizer formulations and its objectives were to observe any benefits which might be derived from minor elements present in

lignite when used in fertilizer mixtures and the effect of soluble aluminum in mixed fertilizers. The check was a standard 8-8-8 fertilizer mixture. None of the materials tested produced yields which were significantly greater than those of the check. Depressed yields resulted from the use of the fertilizer which contained diammonium imido disulfonate. The plants showed definite symptoms of toxicity as evidenced by poor stand, reddening of the stalks, crazy top, and small rounded bolls which did not fully open. The mixture containing special ammonium chloride was also detrimental to germination. —D. M. JOHNS, M. B. STURGIS, AND R. L. ARCENEUX.

Cotton Magnesia-Potash Fertilizer Test—An application of 600 pounds of an 8-8-8 fertilizer increased the yield of seed cotton from 279 to 728 pounds per acre. An addition of 12, 28, and 36 pounds of a water soluble magnesia per acre to the basic application of 8-8-8 fertilizer further increased the yield of seed cotton 73, 95, and 131 pounds per acre, respectively. The yields obtained from smaller amounts of potash and intermediate amounts of magnesia indicate either a replacement value of magnesia for potash in the nutrition of the cotton plant or improved efficiency of the plant in the use of potash with the presence of the magnesia which was applied in the fertilizer. —D. M. JOHNS.

Corn Variety-Hybrid Test

More than 60 hybrids and varieties were included in these tests. The yields ranged from 30 bushels to slightly over 60 bushels per acre. Coker's Coastal 811, La. 9017, La. 468, Dixie 18, Dixie 22, and Dixie 11 produced the highest yields and, in general, were of the best quality. Texas 20, Texas 28, Shannon, and McMullin's Missouri hybrids either produced low yields or very poor quality grain. —D. M. JOHNS, HUGO STONEBERG, AND HUGH IVY.

Corn Fertilizer Tests

Large yield increases resulted from applications of nitrogen up to 75 pounds per acre. Further yield responses were obtained from phosphate and potash when nitrogen was applied. A yield of 51.7 bushels per acre resulted from the application of 300 pounds of a 5-10-10 fertilizer and a side-dressing of 60 pounds of nitrogen, as compared with 45.3 bushels where only 75 pounds of nitrogen were applied. The unfertilized plots produced 12.4 bushels per acre. —D. M. JOHNS.

Small Grains, Forage and Winter Grasses, and Legumes

Sweet Sorghum Variety Test—Five varieties of sweet sorghum were grown and green matter weights were taken as a measure of

their value for silage purposes. Texas Seeded Ribbon Cane and Atlas were the most satisfactory varieties and produced 27.3 and 18.9 tons per acre, respectively.

—D. M. JOHNS.

Crimson Clover Variety Test—Green weight data in the full blossom stage of growth were collected on 10 varieties. Talladega, Thorsby, Allen, Auburn, and Common led in production with yields slightly in excess of eight tons per acre.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Annual Clover Test—Ten varieties, including various Subterraneans, Ball, Lappa, Alsike, Persian, Hop, Button, and Crimson, were grown and green weight data were collected. Crimson, Ball, and Bacchus Marsh Subterranean were the highest producers.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Winter Grasses—Several varieties of fescue and Harding and American rye were grown. Rye produced the highest tonnage of grass. Alta 144 led the strains of fescue in production.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Red Clover New Strains Test—La. Synthetic No. 2 produced more growth than the Commercial Red Clover or the La. Synthetic No. 1.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Oat Variety Tests—More than 30 varieties, strains, and hybrids were included in yield tests. Stanton, DeSoto, Appler, Letoria, Victorgrain, Coker, and Ferguson were the best yielders.

—D. M. JOHNS, C. R. OWEN, AND C. L. MONDART, JR.

Horticulture

Sweet Potato Variety Test—Ten varieties representing those of general interest for table and starch purposes were grown in a yield test. L-241 produced 182 bushels for the highest yield of U.S. No. 1's in the table stock group. L-127 led in the starch group with a total yield of 398 bushels per acre.

Seed Piece Versus Slip Planting of Sweet Potatoes—Whole seed pieces of the Pelican Processor have produced a two-year average of 402 bushels per acre as compared with 232 bushels from slips. Seed and dehydration costs and storage problems were greater from the seed pieces and offset any value that might appear to be associated with the higher yield.

Sweet Potato Fertilizer Test—Various ratios and rates of nitrogen, phosphate, and potash have been studied. Based on the data at hand, the most economical rate of application would be approximately 30-60-60 pounds of nitrogen, phosphate, and potash per acre, respectively.

Sweet Corn Variety Study—Yield records were obtained from 20 entries. Gulf Coast and Lot No. 29531 from Michael-Leonard Company led in production with yields of 878 and 980 dozens of ears, respectively.

Pole Lima Bean Variety and New Strains Test—Florida Speckled Pole, Carolina Sieva, and L39-11F produced the highest yields, 6,836, 5,899, and 5,262 pounds per acre, respectively. L39-11F appeared to be superior for freezing and canning.

Watermelon Variety and New Strains Test—Twelve varieties were grown and yield data recorded. Dixie Queen 110, a new wilt-resistant variety, produced 33,934 pounds of marketable melons per acre, compared with 21,560 pounds for Black Diamond, a well known commercial variety.

Cantaloupe Variety and New Strains Test—Hale's Best No. 36 was the best variety of the seven tested, producing 6,369 pounds of high quality melons per acre, with an average weight of 2.33 pounds.

Cowpea Variety Test—Yield data were collected from 15 varieties. Chinese Red produced 16.2 bushels per acre. Iron Clay failed to mature, and Certified California Buckeye was practically a failure, yielding only 1.2 bushels per acre.

Peach Fertilizer Test—Data on growth response of peach trees to 14 fertilizer treatments have been collected for two years. These data will be used to study the relationship of tree growth and fruiting to the different levels of nitrogen, phosphorus, and potassium fertilization.

—R. E. WRIGHT.

Poultry

A modern type laying house adequate to accommodate 500 hens was divided into two equal pens, with one pen housing a laying flock of 250 hens (no males) and the other pen housing a hatching egg flock of the same size, age, and breed, but mated to produce fertile eggs for hatching. Costs of growing and feeding the males is being determined. The first year is not yet complete.

—D. M. JOHNS AND C. W. UPP.

Marketing of Field Peas

Fresh field peas were shelled, packaged, and marketed in cellophane bags of sizes ranging from one-half to one and one-fourth pounds. Data collected, experience gained in the operations, and customer responses definitely indicated that there may be a relatively strong market for fresh shelled peas.

—J. M. BAKER AND D. M. JOHNS.

Pork Production

Feeder pigs were grazed on 3.75 acres of field corn, and a total body weight gain of 1,500 pounds was obtained. Salt and a protein supplement were supplied. The yield of corn was approximately 50 bushels per acre, and on this basis each bushel, plus the supplement feed, produced eight pounds of pork. —D. M. JOHNS.

Beef Cattle

A herd of 17 grade cows and heifers has been obtained. Six calves have been dropped. Attention is to be given to special grazing and management practices and selected bulls are to be used in an effort to develop nurse cows capable of more economically raising calves for the baby beef market.

—D. M. JOHNS AND JAMES KIDWELL.

Dairying

Jersey Herd—A demand on the part of the local dairy farmers has led to the development of a Jersey herd. Seven registered Jersey heifers were obtained from Louisiana State University and 15 registered Jersey cows were transferred to the Station in 1950 by the U.S.D.A. Experiment Station at Jeanerette, Louisiana.

The dairy ration is composed largely of home-grown feeds, such as corn, dehydrated sweet potatoes, oats, and sweet sorghum grain. Cottonseed meal is the only purchased ingredient. Sorghum silage is fed when pastures are low, and hay is before the cows at all times.

Crossbreeding with the Brown Swiss and Red Sindhi—The Red Sindhi-Brown Swiss crossbreeding work is being conducted as a part of the regional crossbreeding project in cooperation with the Bureau of Dairy Industry. The main purpose of this study is to determine the adaptability and productive capacities of the crossbred animals under southern conditions. The herd has been increased by the addition of 15 Brown Swiss heifers. At the present there are 19 Brown Swiss and Red Sindhi crossbred heifers and 5 crossbred bulls. Six of the crossbreds have been bred and will be in production this spring. The Brown Swiss cows that have dropped a crossbred heifer calf are being bred back to a Brown Swiss bull. The crossbred heifers also are bred to the Brown Swiss bull.

Physiological investigations under natural conditions will be made to determine the relative heat tolerance of the Brown Swiss and Red Sindhi crosses. The objectives are to establish normal body temperatures, respiration rates, and heart rates by various ages when the atmospheric temperature is 60° F. and below and at 85° F. and above. This information will give a measure as to the effect of sub-tropical climatic conditions on the Brown Swiss and cross-

breeds. Observations have shown that the crossbreeds graze more during the hot summer days as compared to the Brown Swiss. More accurate data are needed on grazing time over a 24-hour period in order to obtain more conclusive evidence.

—D. M. JOHNS, J. B. FRYE, JR., AND GEORGE W. SCOTT, JR.*

Northeast Louisiana Experiment Station, St. Joseph

C. B. HADDON, *Superintendent*

JOHN C. CARPENTER, JR., *Assistant Animal Husbandman*

JOHN A. HENDRIX, *Assistant Agronomist*

SHERMAN A. PHILLIPS, *Assistant Agronomist*

RUSSELL Y. RATCLIFF, *Research Associate in Agronomy*

Agronomy

Cotton Insect Control Test—In a large-scale, randomized, replicated field plot test at St. Joseph, La., the following insecticides were compared for control of the boll weevil and cotton aphid: Toxaphene spray formulated from an emulsifiable concentrate containing 4 pounds of toxaphene per gallon at the rate of 2 pounds of technical toxaphene per acre per application; toxaphene spray at the same rate but formulated from an emulsifiable concentrate containing 8 pounds of technical toxaphene per gallon; aldrin-DDT spray at the rate of $\frac{1}{4}$ pound of technical aldrin and $\frac{1}{2}$ pound of technical DDT per acre per application; and 3-5 dust (3 per cent gamma isomer BHC and 5 per cent DDT) at the rate of 10 pounds per acre per application. All applications were made by airplane.

All materials gave satisfactory control of the boll weevil and cotton aphid with the exception of the aldrin-DDT spray, which failed to control the cotton aphid. It was necessary to add parathion to one of the aldrin-DDT applications for control of this pest. There were no differences in yield.

—C. B. HADDON.

Soybean Variety Test—Since 1935 soybean variety tests have been conducted to determine the varieties and strains best adapted to soils and weather conditions in this section of Louisiana. Soybeans are planted on 40-inch rows in four-row plots and cultivated as needed, no fertilizer or inoculation being used. Varieties are grouped according to maturity (early, medium early, medium late, and late). Harvesting is done with a combine.

Varieties producing satisfactory yields over a period of years,

* Mr. Scott is a joint employee of the Louisiana Experiment Station and the Bureau of Dairy Industry, U.S.D.A., stationed at the Federal Livestock Experiment Station, Jeanerette.

according to maturity, are as follows: Early maturing group—S-100, 27.7 bushels per acre; medium early group—Ogden, 39.8; Dortchsoy No. 2, 31.0 bushels per acre; medium late group—Dortchsoy 31, 27.0; Ralsoy, 31.0; Volstate, 25.3 bushels per acre; late maturing group—Pelican, 17.2; Acadia, 17.9; Nela, 19.2; Mamotan 6680, 23.7 bushels per acre.

Results show that when soybeans are grown for oil production, the medium early and medium late varieties give best returns.

—JOHN A. HENDRIX.

Soybean Inoculation Test—This test has been conducted for four years to determine whether inoculation affects the yield of beans and foliage on the Delta soils. One early, one medium early, and one late maturing variety were planted and nine strains of inoculant were used in conducting this test.

Results showed that inoculation of soybeans, planted on rich, well-drained Delta soils, did not have any effect on yield of beans or foliage.

Soybeans in recent years have been used in this section for a cash crop, and on thin, old land where beans have not been grown it probably would be a very good practice to inoculate beans the first year.

—JOHN A. HENDRIX.

2,4-D for Control of Weeds in Corn—The practice of growing corn and soybeans interplanted has been a popular one in this area for some time. But as the mechanical corn picker gains popularity it creates the problem of growing corn free of foreign vegetation. The presence of morning-glory vines, hog weeds, cockleburrs, and other weeds in corn hampers the mechanical harvesting of the crop. It reduces the efficiency of the picker and causes mechanical failures. To overcome this problem tests were conducted with 2,4-D sprayed in corn.

In these tests Funk's G-737 corn was used with 100 pounds of nitrogen applied in split applications. All plots received the same cultivation. Spray was applied when corn was approximately five inches tall at one-half pound, three-fourths pound, one pound, and two pound rates per acre and again at lay-by time at the rate of three-fourths of a pound per acre to all except check plots. One plot received only the lay-by spray of three-fourths of a pound per acre. The yields on all plots were approximately the same, including the check plot which received the same cultivation as the other plots except for the spray. There was no difference in lodging between the sprayed plots and the check plots. At harvesttime the sprayed plots were free of weeds and vines, whereas the check plots were infested.

This test has been conducted for only one year and no definite recommendations can be made from it. But it clearly showed that

weeds and vines can be controlled in corn by spraying 2,4-D and that the yield will not be affected if the spray is applied before the corn is seven inches tall and at lay-by time. —RUSSELL Y. RATCLIFF.

Outfield Soybean Fertilizer and Variety Experiment—A soybean fertilizer experiment was conducted on Olivier silt loam at Delhi, La. Nitrogen was applied at the rate of 16 pounds, phosphate and potash at rates of 24 and 48 pounds per acre. Agricultural ground limestone was applied at the rate of 1,000 pounds to plots that received a 16-24-24 and 0-48-48 formulation. There were two check plots, one of which was inoculated.

There was no increase in yields from the addition of fertilizer, inoculation or lime at this location. Although the plants on the heavier fertilized plots made much faster and larger growth when compared with the plots not fertilized, there was no significant difference in yield between treatments. The soil where this test was conducted was planted the preceding year with soybeans which had been inoculated, and this may have accounted for lack of increase in yield over the plots not inoculated.

A soybean variety test was conducted at the same location with some of the leading commercial varieties. Yields of the varieties, listed according to maturity, were as follows: early maturing—Wabash and S-100 averaged 22.7 bushels per acre; medium early—Ogden and Dortchsoy 2 averaged 39.1 bushels; medium late—Dortchsoy 31, Volstate, and Roanoke averaged 36.7 bushels; late—Acadian, Pelican, Nela, and Mamotan 6680 averaged 30.2 bushels per acre.

—SHERMAN A. PHILLIPS.

Outfield Cotton Fertilizer Experiment—This test was conducted on Olivier silt loam at Winnsboro, La. Nitrogen, phosphate, and potash were applied at the rates of 48 and 72 pounds per acre. The highest yield of seed cotton, 1,510 pounds per acre, was obtained from a 72-72-72 formulation. This was an increase of 1,003 pounds over the check plots, which yielded 507 pounds. The yield of cotton from a 48-48-48 formulation was 1,232 pounds per acre. Past experiments have shown that on this type of soil a combination of 36-48-48 or 48-48-48 per acre has given the highest yields.

—SHERMAN A. PHILLIPS.

Outfield Corn and Soybean Experiment—A fertilizer experiment was conducted in Morehouse Parish with corn alone and corn interplanted with soybeans, one-half of each plot being interplanted with beans. Nitrogen was applied at the rates of 48 and 96 pounds, phosphate and potash at the rates of 24 and 48 pounds per acre. The highest yields obtained were 82.3 bushels for corn alone and 75.6 bushels for corn interplanted with soybeans, these being from the application of 600 pounds of 8-8-8 per acre plus 48 pounds of nitrogen as side-dressing. This was an increase of 71.3 and 65.0 bushels,

respectively, over the check plots. There was no increase from the addition of phosphate and potash until the nitrogen level had been raised above 48 pounds per acre.

In 1950, cotton which followed the above test in 1949 was fertilized with 400 pounds of 0-8-8 per acre. Cotton following corn alone yielded 1,440 pounds of seed cotton, while that following corn interplanted with soybeans yielded 1,810 pounds of seed cotton per acre. This was an increase of 370 pounds of seed cotton due to the soybeans.

—SHERMAN A. PHILLIPS.

Oat Variety Test—Commercial varieties, new strains, and hybrids have been included in oat tests in recent years. These tests are usually planted in early October, with the oats seeded at the rate of 2½ bushels per acre in plots 6 feet wide and 220 feet long. Plots this size are used so as to harvest with a combine.

Over a period of four years yields in bushels per acre for the leading varieties have been as follows: DeSoto, 66.9; Nortex No. 107, 66.5; Stanton, 65.1; Victorgrain, 62.7; Alber, 62.0; Delta Red, 61.9; Fulgrain, 60.6; Camellia, 57.4; and Traveler, 49.7. No fertilizer has been applied to these tests, as plantings are usually made following soybeans.

Since mechanized farming has reduced the number of work-stock on farms, planting oats for grain has correspondingly been reduced. The intensity of oat diseases has also caused a reduction in acreage planted. Oats are planted for winter grazing, principally; and also as a companion crop for lespedeza and some clovers, in the Delta where cotton has been intensively grown.

—JOHN A. HENDRIX.

Animal Industry

Hogging Off Corn and Soybeans—For the third consecutive year in hogging off work here at the Station there was not sufficient difference in gains of the lot fed tankage free choice and the lot fed no tankage to pay for additional cost of feeding tankage. In the lot with tankage it took 3.16 pounds of corn to produce one pound of pork; in the lot without tankage 3.39 pounds of corn were needed to produce one pound of pork. The lot with tankage produced 1,450 pounds of pork from 81.7 bushels of corn and the lot without tankage produced 1,280 pounds of pork from 77.5 bushels of corn. All of the hogs used in this test were sent to the University to have tests for soft pork run on fat samples. One pig out of 14 was killed as soft pork; the others were rated as hard pork.

—JOHN C. CARPENTER, JR.

Production Costs of Feeder Pigs—The results obtained in the second year in the production of feeder pigs to 100 pounds showed pigs could be produced slightly cheaper than the same quality pigs

could be bought on the local markets. All costs were included in production except the actual labor in feeding of pigs. No return was figured for sale of sows. The fall litter in 1949 was produced to 100 pounds for \$.095 per pound. The 1950 spring litter was produced to 100 pounds for \$.152 per pound. The probable reason for the big difference in per-pound cost of producing feeders is that the spring litter was pushed all the way and the fall litter was not. All feed costs were figured at local price of feed at time used. The same



Hogging off corn and soybeans at the Northeast Louisiana Experiment Station.

quality feeder pigs were selling on local markets at 18 to 24 cents per pound at the time the pigs reached 100 pounds.

—JOHN C. CARPENTER, JR.

Pasture Gains for 1950—Six plots of eight acres each were used in this experiment. Approximately one steer per acre grazed from Feb. 20 to Nov. 6, 1950, in all plots except No. 6. Plot No. 6, which contains Kentucky 31 fescue and white Dutch clover, one-half, and Ladino clover, one-half, was grazed one head per acre from Feb. 7 to May 5, from June 19 to Sept. 23, and from Nov. 6 to Dec. 18, 1950. Plot No. 1 contained Persian clover and Dallis grass, No. 2 white Dutch clover and Bermuda grass, No. 3 red clover and Dallis grass, and No. 4 white Dutch and Alsike clovers and Dallis and Bermuda grasses. Red clover was seeded every third year in Plot No. 3. Plot No. 5 was not seeded and contained only native grasses and clover.

All pasture plots except 5 and 6 were seeded in 1941. Plot No. 6 was seeded in the fall of 1948. Gains were as follows: Plot 1, 310.6 pounds; Plot 2, 352.5 pounds; Plot 3, 421.9 pounds; Plot 4, 408.1 pounds; Plot 5, 301.3 pounds per acre. All steers were wormed and sprayed as needed. Salt was fed free choice on all plots.

—JOHN C. CARPENTER, JR.

Winter Pasture Experiment—Three groups of stocker calves were used in this experiment. Fourteen calves were turned on 10 acres of oats and Singletary peas and fed nothing else through the winter. Fifteen calves in Group No. 2 were on 10 acres of oats and Singletary peas and were fed one pound of cottonseed pellets per head per day. Each of these groups had access to wooded area. In Group No. 3, 15 calves were kept on a permanent pasture plot which contained dried Bermuda grass, and were fed four pounds of corn and cob meal and one pound of cottonseed pellets per head per day. The calves were placed on plots on Dec. 14, 1949, and taken off Feb. 20, 1950. Winter gains for plots were as follows: Plot No. 1, 185 pounds; Plot No. 2, 640 pounds; and Plot No. 3, 350 pounds. When taken off winter pasture, three calves from each group were placed in each of five permanent pastures and gains checked through spring and summer. Total gains for the first 84 days on spring pasture were: Group 1, 2,055 pounds; Group 2, 2,285 pounds; and Group 3, 2,255 pounds.

It is indicated from this test that it is not profitable to feed stocker steers through the winter, if sufficient pasturage is available to maintain them in thrifty condition. Even though some weight is lost during the winter months, if good spring pasturage is available, the losses are fully made up by June. —JOHN C. CARPENTER, JR.

Plaquemines Parish Experiment Station, Diamond

RALPH T. BROWN, *Superintendent*

FREDERICK B. SCHMITZ, *Assistant Horticulturist*

The development of this Station had its beginning in the early spring of 1949. Since that time four residences, a storage shed, garage and office-laboratory building have been constructed.

Several hundred attended the Official Opening and Field Day, which was held in May. The event was climaxed by a barbecue sponsored by the Plaquemines Parish Police Jury.

Citrus

A fertilizer experiment involving 12 fertilizer treatments was set up in randomized blocks at the Station on Owari Satsuma and Washington Navel trees which were planted in the spring of 1949.

A similar outfield experiment was begun with bearing Satsuma trees at Mr. Felix Elstons' at Buras, La.

Seedlings of rootstocks secured from Dr. Gardner of the U.S. Subtropical Fruit Field Station have been budded to Owari Satsuma, Washington Navel, Pineapple Sweet and Valencia, for planting in the winter of 1951, in hopes of finding a rootstock better adapted to this area than sour or trifoliata, the two which are most widely used.

Budwood of some 25 different varieties and species of citrus, collected by Dr. F. E. Gardner, have been budded and the trees planted for trial and observation at this Station, together with a selection made by Mr. Lynn Hawthorne of the Louisiana Agricultural Experiment Station.

Easter Lilies

The fertilizer and spacing test was planted again this year. From observations, it appears the best results might be obtained when the fertilizer is applied as a top-dressing rather than placed underneath at time of planting, because of dry weather usually encountered at time of planting.

In addition, a test was made to determine the best depth of planting for the three sizes of bulbs most commonly used. The studies were set up by Dr. W. D. Kimbrough, Mr. Howard Hanchey, and Mr. Joe Montelaro of the Louisiana State University.

Vegetable Crop Studies

Bush Beans—Forty-one varieties and breeding lines were planted in cooperation with the U.S. Vegetable Breeding Laboratory, as a part of the Southern Regional Snap Bean Trials.

Contender has exceeded all other varieties in production in the tests conducted here for the past two growing seasons. It has consistently produced twice as many beans as Stringless Black Valentine, the variety most widely used in commercial plantings in this area. The pods are similar to those of Black Valentine, but are slightly curved. It has matured a week to ten days earlier than Black Valentine, which makes it very promising for the early plantings in this area.

Topcrop (Fulcrop), another early, high-yielding variety, is too rough to sell in competition with Stringless Black Valentine and Contender. There were also several breeding lines which showed considerable promise.

Pole Beans—Canfreezer and Green Savage were grown in replicated plantings in the spring and summer in comparison with Reuter's Ideal Market, Kentucky Wonder, Black Creaseback, and Blue Lake. Reuter's Ideal Market was the only variety which exceeded Canfreezer and Green Savage in production. The average production

in bushels per acre for the two plantings was as follows: Reuter's Ideal Market, 333; Green Savage, 316; Canfreezer, 303; Kentucky Wonder, 241; Black Creaseback, 215; and Blue Lake, 145.

Reuter's Ideal Market is a string bean which has been grown in the past as the commercial variety in this area but is more susceptible to rust and does not compare with Canfreezer and Green Savage in quality. Canfreezer was preferred by most of the vegetable growers who saw the trials, because of its early, heavy production of high-quality beans. Green Savage was quite variable as to pod shape, but it produced over a more extended period than did Canfreezer.

Pole Lima Beans—Carolina Sieva produced 415 bushels per acre as compared to 368 for L 39-11F, which was second in production. Carolina Sieva is the preferred variety because of its early, heavy production. It comes into production a week ahead of L 39-11F.

Cabbage—Glory of Enkhuizen, All Head Early, Louisiana All-year, and Bonanza were the four leading varieties of the 13 tested at this Station in the fall of 1950, producing 12,575, 11,867, 9,716, and 9,554 pounds of marketable cabbage per acre, respectively. Glory of Enkhuizen was slightly earlier than All Head Early and Louisiana All-year and much earlier than Bonanza. All Head Early had the poorest internal quality and Bonanza the best. The ability of Bonanza to remain headed for an extended period is most desirable; however its late maturity makes it less desirable for fall planting than Glory of Enkhuizen or Louisiana All-year.

Cauliflower—Ten commercial varieties of cauliflower were grown in fall trials at this Station under the supervision of Dr. Julian C. Miller and Dr. J. J. Mikell of Louisiana State University.

Snowball A and Snowdrift were the best varieties in the early maturing group, producing 4,954 and 4,491 marketable heads averaging 2.3 and 3.0 pounds per head, respectively.

In the medium-early group Snowball M, Stella Nova and Super Snowball were superior to Snowball X, producing 4,981, 4,219 and 3,811 heads averaging 2.6, 2.8, and 2.9 pounds per head, respectively.

Snowball Y was the best in the late maturing group, which included Helios. Snowball Y produced 4,437 marketable heads per acre which averaged 3.1 pounds per head.

Root Aphids Study—A test on the control of root aphids on cauliflower and cabbage was established in the fall of 1950 in cooperation with Mr. E. H. Floyd, Entomologist with the Louisiana State University Experiment Station. The insects were not of serious consideration but of the four materials tested Lindane applied at the rate of one pound of technical Lindane per acre showed considerable promise.

Eggplant—A variety test including New Orleans Market, Creole, Fort Myers Market, and Black Beauty was conducted as a preliminary to hybridization studies, which will begin in the spring. The New Orleans Market and Creole varieties were the market preference (at New Orleans) in color and shape.

There was no significant difference in yield, although there was a trend for Black Beauty to be slightly more productive, yielding 10,376 marketable fruit per acre as compared to 9,973 for Creole and 9,124 for the New Orleans Market.

Foliage diseases were controlled by frequent sprayings with "Copper A."

Staking or tying the plants to a wire strung above the row is an advantage later in the season when the plants are large and the fruit are borne higher on the plant.

In addition to the four varieties mentioned above, the Florida Highbush and New York Purple will be used in hybridization studies. All possible crosses have been made between these six varieties. The seed from these crosses will be planted in the spring of 1951 in a test with the commercial varieties of eggplant now on the market.

Irish Potatoes—Of the seven varieties and breeding lines planted at this Station, LaSoda was again unexcelled in appearance.

The average yield of Number 1 potatoes in bushels per acre for the four plantings this season was: Kennebec, 143; LaSoda, 137; and DeSoto, 131, as compared to 91 for Katahdin and 73 for Triumph.

Tomatoes—Twenty different commercial and home garden varieties have been grown in the spring trials during the last two seasons and the average yield of marketable tomatoes in pounds per acre for the leading varieties during this period was as follows: Rutgers, 24,603; Gulf States, 24,278; Jefferson, 22,961; Marglobe, 21,296; Lakeland, 19,696; and Grothen Globe, 14,972.

Although Rutgers and Gulf States have out-yielded Jefferson in total marketable tomatoes, they both show considerably more cracking than Jefferson, and Rutgers was slightly later.

Rutgers, Jefferson and Marglobe were about one week later maturing than the other three varieties.

Sweet Corn—Eighteen sweet and market corn varieties were tested in replicated trials and the varieties divided into four groups based on maturity, as follows: Early—those maturing earlier than Golden Cross Bantam; medium early—those maturing about the same time as Golden Cross Bantam; late—those maturing from two to five days later than Golden Cross Bantam; very late—those maturing from ten days to two weeks later than Golden Cross Bantam.

In the early maturing group Aristogold Bantam Evergreen was

considered the best, with an average yield of 4,154 marketable ears per acre. Golden Security exceeded all varieties in production in the medium maturing group, producing 7,498 marketable ears per acre as compared to 5,537 for Tristate and 5,172 for Golden Sweet. However, Tristate was slightly larger and had the best appearance.

In the late maturing group Oto exceeded all varieties in production of marketable ears, with an average of 7,247 ears per acre; whereas Gulfcoast produced 7,185 marketable ears per acre. Gulfcoast was preferred since it produced slightly larger ears.

Cucumbers—Eleven commercial varieties and breeding lines have been tested and the average marketable yield in bushels per acre has been as follows: Santee, 260; Marketer, 235; Cubit and Palmetto, 208; and A & C, 176. However, 37 per cent of the fruits of Palmetto had hollow spaces. The color tended to bleach out towards the end of the harvest season in the case of Santee and Cubit.

Cubit was the earliest maturing variety in the test and Palmetto the latest. Palmetto and Santee showed considerable resistance to downy mildew.

Cantaloupe Trials—Seven commercial varieties and breeding lines were tested in the spring, as part of the Southern Regional Cantaloupe Trials. Georgia 47 and Weslaco H exceeded all other varieties in production and quality. Georgia 47 showed the greatest resistance to downy mildew, followed by Weslaco H and Smith's Perfect.

Red River Valley Experiment Station, Curtis

J. Y. OAKES, *Superintendent*

E. C. BASHAW, *Assistant Agronomist*

W. A. NIPPER, *Assistant Animal Husbandman*

The Red River Valley Agricultural Experiment Station is located in Northwest Louisiana in the Red River Valley. The Station was started during the early part of 1949 and has been developed with all essential buildings completed and a complete experimental program put into effect.

The station was established primarily for the purpose of obtaining experimental information on alluvial soils of the Red River but much of the work undertaken may be applicable to the surrounding upland sandy soils of Northwest Louisiana.

Crops that are common to the Red River Valley are dealt with, with emphasis placed on new strains and improved varieties for increased production. The fertilizer requirement of each strain or

variety is receiving special consideration with varying ratios and amounts of each material.

Forage crops, grasses and clovers are being given much attention for future needs of the rapidly expanding livestock industry within the area. The development of pastures and pasture management in relation to livestock are receiving special consideration.

During 1950 numerous varieties and strains of corn, cotton, soybeans, alfalfa, grasses and legumes were under study. Each of these received adequate fertilizer to produce maximum yields. Study of beef cattle in relation to pasture development and management was started.

Corn Work

Corn does not rank first in importance in the Red River Valley but with the advent of hybrid varieties and better fertilizer practices, high yields are more prevalent than at any time in the past. As a result, it is becoming more important as a cash crop for seed and for use as feed in the production of beef cattle.

Fertilization—Experiments on the fertilization of corn were started in 1948 using a variety adapted to the area. Three years' results indicate that nitrogen fertilizer plays the most important part in producing high yields in the Red River Valley. Applications were made in varying amounts of nitrogen alone and in combination with phosphorus and potassium to determine the place of each in a mixed fertilizer. The results indicate that 90 to 100 pounds of nitrogen is required to produce maximum yields. There was little response from the use of phosphorus and potassium, but it is thought that these two elements have a place in a mixed fertilizer and additional study will be required to determine the proper ratio required.

The number of stalks per acre has been considered in securing maximum yields and it appears that single stalks spaced 16 to 18 inches apart give best results. Yields for three consecutive years have been 80 to 100 bushels per acre.

—J. Y. OAKES AND E. C. BASHAW.

Hybrid Corn—Open-pollinated commercial varieties and popular hybrids developed by the Louisiana Agricultural Experiment Station and other experiment stations are placed under study to obtain information in relation to yields, erectness of plants, lodging characteristics, husk grade, height of plants, and height of ears on plants. These factors affect the desirability of corn varieties for different areas.

Among the commercial varieties grown, several in both yellow and white have consistently produced high yields and have proved very satisfactory for the Red River Valley. Of the white varieties, Dixie 11, La. 468, Dixie 17, Funk's 780W, and Funk's 790W have

proved very desirable. Of the yellow varieties, Dixie 18, Funk's G714, Dixie 22, Funk's G737 and N.C. 27 have proved very satisfactory.

Commercial varieties and hybrids are fertilized at a uniform rate of 90 to 100 pounds of nitrogen per acre. Yields under favorable conditions have ranged from 90 to 100 bushels per acre.

—J. Y. OAKES, E. C. BASHAW, AND H. W. IVY.

Fertilization of Corn and Soybeans—Corn and soybeans were interplanted, with the corn spaced 18 inches apart in 42-inch rows. Forty pounds of nitrogen with phosphorus and potassium was applied before planting, with the remainder applied when the corn plants were 18 inches high. Plots that were not fertilized were used as checks. Three rates of fertilization were used: a 40-40-40, 80-40-40, and 120-40-40. The no-fertilizer plots produced the highest bean yield; and with each increase in nitrogen, the bean yield dropped slightly, with a yield of 24.3 bushels for no fertilizer and 18.2 bushels from 120 pounds of nitrogen. Corn yields were consistently higher on plots having no beans, with the highest yields from the 120-pound application of nitrogen.

The object of the experiment is to determine the effect of soybeans on corn yields over a long period of time and to utilize phosphorus and potassium in bean yields since little response has been obtained from these elements in increasing corn yields.

—J. Y. OAKES AND E. C. BASHAW.

Oat Varieties

Sixteen oat varieties from various southern states were included in a test to check the performance from the standpoint of adaptability, disease resistance, forage produced and grain. Observations were made through the growing season to determine the forage value of each variety. The Coker Fulbright, Fulgrain, Louisiana 42-48, and Victorgrain would have provided the earliest grazing. The Florida 167, Anderson, Camellia, DeSoto, and Ferguson varieties are also good forage types and would have provided excellent grazing.

The yields were severely reduced by rust. The leading varieties in the 1949-50 test were Camellia, Louisiana 42-48, Victorgrain, and DeSoto. In the 1948-49 test the best yields were obtained from Alber, Victorgrain, Fulgrain, and Florida 167. The yields for the entire test during 1948-49 were higher than during 1949-50.

—J. Y. OAKES AND E. C. BASHAW.

Soybeans

The Station has been co-operating with the U.S. Regional Soybean Laboratory in conducting uniform soybean tests on new vari-

eties and strains. The chief objective of the project is the development of adapted varieties for oil production.

Numerous varieties and strains were included in the test. They ranged in maturity from early September to early November. Most of the strains have not been named and have not been released for commercial production. Outstanding strains will be released to farmers as soon as their performance merits it.

Commercial varieties are placed in a test to determine those varieties best adapted to the area for seed and forage production. Commercially grown varieties producing satisfactory yields include the S-100, Ogden, and Ogden selections in the early group; Volstate and Roanoke in the medium late group; and Acadian and improved Pelican (La. 41-1219) in the late maturing group.

—J. Y. OAKES, E. C. BASHAW, AND JOHN P. GRAY.

Cotton Studies

Fertilization—The fertilization of cotton in the Red River Valley has received much attention in recent years. Farmers have begun to approach maximum yields on a minimum acreage as a result of better fertility measures, better seed and more rigid insect control.

A fertilizer experiment was made using 600 pounds of mixed fertilizer per acre. The ratios varied from zero to 12 per cent for the elements nitrogen, phosphorus, and potassium. In addition, nitrate of soda, ammonium nitrate, ammonium sulphate, and anhydrous ammonia were used at optimum rates to determine source or sources of materials best suited to the production of cotton.

In general, under comparatively dry conditions best results have been obtained from an 8-8-8, 12-8-8, 8-8-4, 10-8-8, and 8-0-8, but under conditions where normal rainfall was well distributed over the growing season, the nitrogen applications alone have given excellent results.

Side-dressing applications of nitrogen fertilizers alone showed some increase over applications made at the same rate before planting but were not significant.

Forty to fifty pounds of nitrogen fertilizer alone appears to give about maximum yields under favorable conditions. The application of phosphorus and potassium is not discouraged, as in a dry year potash deficiencies, nematodes, and wilt are very prevalent. These elements assist in better maturity and more normal growth of the plants.

—J. Y. OAKES AND E. C. BASHAW.

Varieties—An analysis of 24 commercial varieties showed that Bobshaw 1, Delfos 651-6304, Fox, Deltapine 15, White Gold Wilt, Coker 100 Staple, Miller 610, Coker 100 WR, Plains, and White Gold Strain 5 were the leading varieties. Of these varieties the lint per cent varied from 35.9 per cent on Coker 100 WR to 39.8 per cent on

Deltapine 15. The Deltapine 15 has consistently produced the highest percentage of lint over a period of three years. The staple length has varied from 1 1/16 inch on Bobshaw 1, to 1 5/32 inch on Coker 100 Staple and Coker WR. The other varieties in this group vary between these extremes.

The number of bolls required to produce a pound of cotton ranges from 65 on Miller 610 and White Gold Wilt to 75 on Deltapine 15. The other varieties in this group vary between 65 and 75 bolls per pound.

Yields on these varieties range from 933 pounds of lint cotton on Bobshaw 1 down to 801 pounds on White Gold Strain 5, with the other varieties falling between these extremes.

Tests on the advanced strains, new strains, and progenies of Deltapine 14 have given high yields, a high per cent lint, and a good staple length.

—E. C. BASHAW, J. Y. OAKES, F. W. SELF, AND J. E. JONES.

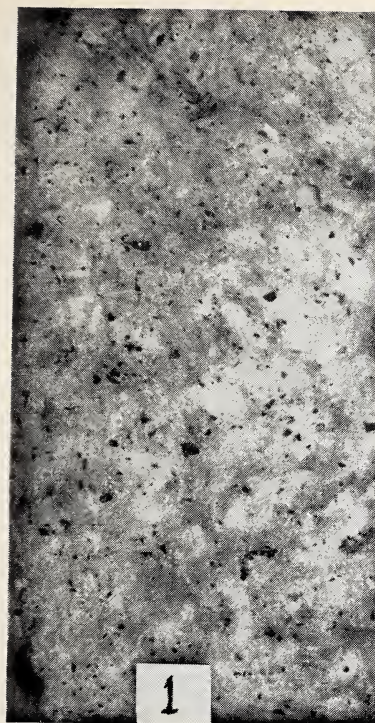
Mechanization—In the mechanized picking test on Deltapine 15-51, Fox, Deltapine 15, Plains, Empire, C.R. 1, Coker 100 WR,



A high degree of efficiency in mechanical picking can be obtained if there is a good stand, properly defoliated, and machine is operated at slow speed.

Stoneville 2B, Louisiana 33, and Mebane 6801; the Deltapine 15-51, Fox, and Deltapine 15 were the three best yielding varieties. Deltapine 15-51, Fox, Deltapine 15, Plains, and Empire were better adapted to picking by machinery.

The lint samples Nos. 1 and 2 shown on page 157 were harvested with a mechanical picker. Sample No. 1 graded good ordinary, while sample No. 2 graded strict low middling. The difference of two grades between these samples was due to varietal characteristics.



Lint samples from cotton harvested with a mechanical picker.
(See "Mechanization" in accompanying text for descriptions.)

Samples were cleaned and ginned on an experimental gin. Samples Nos. 3 and 4 were harvested with a spindle-type picker and ginned on a commercial gin with modern cleaning equipment. Lint sample No. 3 graded strict middling, while sample No. 4 graded middling. The difference of one grade between the lint samples was due primarily to the fact that the latter sample was harvested after a rain.

Test on the efficiency of a mechanical picker showed that where cotton was well defoliated with a majority of it open, as much as 92.4 per cent of all cotton could be picked the first time over and a large percentage of what remained could be obtained by scraping. The efficiency of the machine, however, will depend on the number of remaining leaves, excess vegetation, grass, vines, etc., condition of picker mechanically, and speed of operation of machine.

—J. Y. OAKES, E. C. BASHAW, F. W. SELF, AND J. E. JONES.

Cotton Insects—The control of cotton insects in Louisiana in the production of cotton is a *must* on the list of a few essential things to be done in order to produce maximum yields.

Comparison of Dust and Sprays for Insect Control

Treatment	Boll Weevil Infestation (Per cent punct. sqs.)	Bollworm Injury (Per cent inj. bolls)	Yield of Seed Cotton (Pounds per acre)
No Treatment.....	58.42	13.50	636
20% Toxaphene - 40% Sulphur Dust.....	38.71	3.62	1446
Toxaphene Spray.....	4.71	5.00	1 48
Toxaphene - DDT (2-1) Spray.....	31.08	.62	1938

All treatments resulted in less damage from the boll weevil and bollworm and produced higher yields than the check. The toxaphene-DDT spray was significantly better than the toxaphene spray. There was no significant difference in boll weevil and bollworm injury between the toxaphene dust and toxaphene-DDT spray, but if the yields are used as a basis for comparison, toxaphene-DDT spray was more effective.

—C. R. JORDAN, E. C. BASHAW, AND J. Y. OAKES.

Insecticide Test on Cotton—A comparison was made of insecticides applied as dust, wettable powder, concentrate spray, and emulsion concentrate spray. Plots consisted of 12 rows of sufficient length to make .42 acre in size. Applications of dust or spray were made at five-day intervals. Insect infestation counts were made at regular intervals. Results of the test showed that where calcium arsenate spray was used, cotton produced 1,823 pounds seed cotton per acre; wettable BHC-DDT spray, 2,547 pounds seed cotton; miscible BHC-DDT spray, 2,400 pounds seed cotton; and 3-5-40 dust, 2,434 pounds seed cotton. The results show that all materials pro-

duced significantly better yields than where calcium arsenate alone was used.

—L. D. NEWSOM AND E. C. BASHAW.

Forage Crop Studies

Alfalfa Varieties—Results for the first and second year of the alfalfa variety test are presented in the following table.

Variety	1949	1950
	Tons Hay Per Acre	Tons Hay Per Acre
Buffalo.....	7.74	8.08
Arizona Chilean.....	9.70	8.01
Hairy Peruvian.....	10.35	8.01
Southwestern Common.....	10.41	7.99
Peerless.....	9.99	7.78
Atlantic.....	9.36	7.64
Oklahoma Common.....	9.90	7.31
Kansas Common.....	9.21	7.28
Ranger.....	9.10	6.96
French Du Puitt.....	8.46	6.37
African.....	7.30	5.37

Yields for 1950 were somewhat lower than for the previous year, but the relative rank of the varieties remained about the same. Five cuttings were made at approximately four- to six-week intervals, depending on weather conditions.—E.C. BASHAW AND J. Y. OAKES.

Sudan Grass—Three varieties of Sudan grass were tested in 1950 as in 1949. Yields for each variety are presented in the following table in tons of air dry hay per acre.

Variety	1949	1950
	Tons Hay Per Acre	Tons Hay Per Acre
Tift.....	16.3	10.06
Sweet.....	15.9	9.92
Common.....	12.5	7.85

For the second consecutive year the Tift produced the highest yield, with Sweet running a close second. The crop provides excellent hay if cut at the proper time and provides an excellent temporary pasture for late summer months if properly managed. Sudan grass provides an excellent hay crop but it is very difficult to cure and usually requires about one week to air dry in field before baling or stacking. Even with its slow drying qualities the palatability of the hay is apparently not reduced when rained on before baling or stacking.

—E. C. BASHAW AND J. Y. OAKES.

Lespedeza—Four of the more prominent varieties of Lespedeza

—Kobe, Korean, seresia, and common—and nine selections obtained from the Department of Agriculture were tested during the summer of 1950. None of the varieties tested performed satisfactorily. They produced limited growth and were lacking in vigor. Preliminary data indicated that lespedeza may be unsuited to the Red River Valley except in isolated cases.

Alyce Clover and Hairy Indigo—Plots of Alyce clover and hairy indigo were under observation during the summer of 1950. One harvest of hay was made and each of these crops produced a good yield of hay. Hairy indigo produced 2.4 tons of hay per acre and Alyce clover produced 2.0 tons. Alyce clover produced forage of a very high quality and showed considerable promise where a late, rapidly growing crop is desired for hay. The hairy indigo forage was of very poor quality.

Red Clover—All of the red clover varieties tested looked good; two and possibly three cuttings of high quality hay per year can be obtained from this crop. Kenland, Cumberland, and the Louisiana polycross varieties have shown up particularly well.

Miscellaneous Legumes—Of the miscellaneous legumes, Alsike, black medic, hop clover, and bur clover looked good. Persian, Lappa, Subterranean, Rose, and Ball clovers produce an excellent growth for a short period of time in the spring, but considering their short life and the fact that they leave the ground practically bare when they go out, their value except in special cases is doubtful.

Preliminary results indicate that birdsfoot, trefoil, and other lotus strains are not adapted to the area.

—E. C. BASHAW, J. Y. OAKES, AND W. A. NIPPER.

General Observations from the Forage Crops Nursery—Of the 26 grasses in the forage nursery, the fescues (particularly Ky. 31), ryegrass, Bermuda grass (particularly coastal), Dallis grass, and Sudan grass have proved to be well adapted to the area. Some of these grasses have already been placed in pasture experiments and the others are soon to follow. The prairie and Harlan strains of brome grass have shown up well in the plots but more information is needed before large-scale pasture tests will be attempted with them.

Preliminary tests indicate that Rhodes grass and Teff grass have considerable promise for summer grazing.

Reeds canary grass shows a little promise but its practical value is doubtful where so many other grasses are well adapted.

Orchard grass and tall oatgrass, although they have survived, make very little growth in this area and are considered to have little or no value as pasture grasses in this area.

Bulbous bluegrass, Smilo, and Veldt grass were not suited. They failed to survive the first year.

Several attempts have been made to obtain a stand of Harding grass but so far have failed.

Future results from the grass tests seeded in 1950 should aid considerably in the evaluation of some of the above grasses as well as lovegrass, the bluestems, carpet grass, and many others.

—E. C. BASHAW.

Animal Industry

Pasture Studies—Pasture studies were started in 1949 to evaluate several grazing crops. The crop or crop combinations are oats



Cattle require adequate hay when not in pastures. Minerals are provided and kept dry under the shed.

alone, followed by Johnson grass; oats and Singletary peas, followed by Johnson grass; fescue-white Dutch clover, and fescue-Ladino clover.

The pastures were established in the fall and winter of 1949, but grazing was delayed until July 1950 because of insufficient animals to utilize them. Cattle were grazed from July 10 until Oct. 31, on Johnson grass that followed the oats and oats and Singletary peas and the fescue-white Dutch clover and fescue-Ladino clover pastures. The pastures were stocked at the rate of four animals on five acres owing to the possible critical grazing period occurring during July and August as a result of usual low rainfall during these months.

The cattle on the fescue-white Dutch clover pastures gained 1,393 pounds for the 112-day period, or an average gain of 1.55 pounds per animal. Fescue-Ladino clover produced 1,235 pounds of beef with an average daily gain of 1.35 pounds per animal, while

Johnson grass produced 1,188 pounds of beef with an average daily gain of 1.32 pounds per animal.

—W. A. NIPPER, J. Y. OAKES, AND E. C. BASHAW.



Grade Herefords on oats and Singletary peas at the Red River Valley Experiment Station in 1950. The Station did not have enough cattle to utilize all of the grazing.

Hogging Off Corn and Soybeans—Hogging off corn and soybeans is a profitable practice when properly managed.

Three acres of corn and soybeans were interplanted, with one acre planted to S-100 soybeans and an early hybrid, Funk's G50, and the remaining two acres planted to Ogden soybeans and a late maturing hybrid, Dixie 11 corn. Hogs were purchased locally, and as the early hybrid matured, it was fenced off and hogs turned on to utilize the crop. When the first acre was finished an additional acre was cross fenced and hogged off. When this was completely utilized the last acre was used in finishing the hogs off for market.

Three hundred sixty pounds of corn, together with the green beans, produced 100 pounds of pork per acre. The selling price for the finished hogs was \$19.07 per hundredweight.

A net profit of \$202.08 per acre was realized after deducting cost of tankage, minerals, salt, worm treatment, vaccines, and dry lot feeding of the hogs for 30 days, representing a cost of \$107.80.

—W. A. NIPPER AND J. Y. OAKES.

Rice Experiment Station, Crowley

RUFUS K. WALKER, *Superintendent*

NELSON E. JODON, *Associate Agronomist (U.S.D.A.)*

L. GEORGE COONROD, *Assistant Agricultural Engineer*

ROY JEAN MIEARS, *Assistant Agronomist*

DAVID E. BLACK, *Research Associate in Agronomy*

CHARLES N. BOLlich, *Research Associate in Agronomy*

EARL A. SONNIER, *Research Assistant in Agricultural Engineering*

Experimental work was conducted on both the old and the new Rice Experiment Stations during 1950. This work consisted of the following lines of investigation: rice fertilization, rice drying and storage, pasture-rice rotation, forage crop investigations, rice breeding, and variety testing. Approximately 1,400 barrels of foundation seed of six varieties were produced and will be distributed to seed rice growers.

Some of the improvements on the new station during 1950 consisted of fallow working all idle land, leveling all fallow land, expansion of irrigation facilities, construction of one 40x100-foot steel machinery storage shed and two houses for staff members, and the near completion of an office building at the new Rice Experiment Station.

Rice Drying and Storage

Temporary Storage of Undried Rice—Extensive testing of temporary storage of rice with a high moisture content was carried out during 1949 and 1950. These studies were stimulated by the critical harvest period of early rice that has occurred during the last few years. About 40 per cent of the total rice crop in Louisiana has been harvested in approximately two weeks time and the present drier and bulk storage facilities are not adequate to handle this volume in this short period. This overcrowding of available facilities has resulted in depressing the price of rice, and lowering the milling quality of the grain. Studies on temporary storage of undried rice were made in a glass lined bin that can be hermetically sealed and in two 500-bushel Butler bins in which an aeration system had been installed.

Glass Lined Bin—Two hundred and sixty barrels of Rexoro rice with a moisture content of 18.1 per cent direct from the combine were stored in the bin Nov. 10, 1949, and temperature readings were recorded until June 12, 1950. The bin was opened on that date and many tests and analyses made on the rice. Three hundred and sixty barrels of Zenith rice with 19.3 per cent moisture were sealed in

the bin Oct. 4, 1950, and temperature recordings and carbon dioxide concentration readings were made during storage. The bin was opened Nov. 9, 1950. The rice did not heat to a critical point during the storage of either lot. An objectionable odor was noticed each time the bin was opened but this odor was more pronounced after the long period of storage than after the shorter storage period. Germination of the rice was very low after storage of both lots. The milling quality was not altered appreciably during storage and there are indications that the odor disappears in the milling process.

Aeration—Two 500-bushel Butler bins with an aeration system were installed and two lots of undried Zenith rice direct from the combine were placed in the bins. The aeration system pulled air down through the rice and was very successful in keeping the rice from heating. The data collected on this experiment indicate that rice may be kept for long periods by aeration.

Rice Drying "On the Farm"—Studies were made during 1950 to determine if rice could be dried in storage bins of 500- and 1,000-bushel capacities by aeration without supplementary heat and by using portable driers that furnish aeration with supplementary heat.

Drying Rice in Bins by Aeration with Atmospheric Air—Two different lots of undried Zenith rice with initial moisture contents of 19.2 per cent and 22.5 per cent were successfully dried by drawing air down through the rice in the 500-bushel bins. Climatic conditions were very favorable for both periods of operation and definite conclusions concerning drying of rice by this method should not be made until further study under adverse climatic conditions can be conducted.

Drying Rice in Bins by Aeration with Supplementary Heat—Three different lots of undried rice were dried in two 1,000-bushel bins by forcing heated air up through the rice. A portable gasoline engine-driven fan with the heat from the engine used as supplementary heat was used to dry two lots of rice, while another portable drier (FoodKeeper) with an electrically driven fan and a thermostatically controlled fuel oil heat exchanger was used to dry the third lot of rice. Detailed data on temperature, relative humidity, volume of air, moisture at different levels, milling quality, and costs of operation were recorded. The first year's data from these studies indicate definite possibilities of developing "on the farm" drying and storage, and more intensive work should be carried out on this project.

Long-Time "On the Farm" Storage of Dried Rice—The need for orderly marketing of the rice crop by the farmer has long been recognized. Since the loan program was initiated by the Production and Marketing Administration, safe bulk storage and insect control

has become imperative to both the rice farmer and the government. Experimental studies have been conducted on rice from the 1948, 1949, and 1950 crops to determine:

1. The best types and materials of construction of storage bins.
2. The safe moisture levels at which rice can be stored.
3. Proper fumigation materials and methods of fumigation.

A vast amount of data has been accumulated from studies of rice from the 1948 and 1949 crops. Rice from the 1950 crop will be kept in storage until deterioration occurs, and detailed data are being gathered from this series of experiments.

The data accumulated to date show that rice containing more than 14½ per cent moisture cannot be safely stored and that insects can be effectively controlled in bulk storage by periodic fumigation. To date all types of storage appear to be satisfactory but the long-range study under way may give more definite information concerning this phase of the project.

—L. G. COONROD, H. T. BARR, AND R. K. WALKER.

Fertility Studies: Rice

The Effect on the Yield of Rice from the Application of Different Amounts and Combinations of Nitrogen, Phosphorus, and Potassium. *Drilled Rice*—A fertilizer test consisting of 27 different rates and ratio combinations was conducted during 1950 on drilled Bluebonnet rice. The field design was a randomized factorial test which included three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P_2O_5 per acre), and three rates of potassium (0, 20, and 40 pounds of K_2O per acre). The fertilizers were applied at the time of seeding.

Both the application of nitrogen and phosphorus gave an increase in the rice yield. The application of potash did not show a significant increase in the yield. There was no significant difference in yield between the 20-pound application and the 40-pound application of either nitrogen or phosphorus. Where both nitrogen and phosphorus were applied at 20- or 40-pound rates the average yield was 20.45 barrels per acre. In the treatments where both were missing the average yield was 14.90 barrels per acre. Nitrogen applications without phosphorus gave an average yield of 16.25 barrels per acre, and phosphorus applications without nitrogen gave an average yield of 17.83 barrels per acre.

Water Planted Rice—A fertilizer test consisting of 27 different rates and ratio combinations was conducted during 1950 on water planted Magnolia rice. The field design was a split-plot randomized factorial test which included three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P_2O_5 per acre), and three rates of potassium (0, 20, and 40 pounds

of K_2O per acre). The plots were split with a method of handling the water after seeding—one-half of each plot was drained five days after seeding, and the other half was flooded until harvest. All fertilizers were applied as top-dressing.

The application of both nitrogen and phosphorus gave an increase in rice yields. The application of potash did not affect the yield of rice. There was a significant increase in rice yield from the application of 40 pounds of nitrogen in comparison with the yield received from the application of 20 pounds. Where neither nitrogen nor phosphorus was applied the average yield was 13.3 barrels per acre. Where both were applied the average yield was 19.2 barrels per acre. The average yields from the application of nitrogen and phosphorus were: no nitrogen, 14.50 barrels per acre; 20 pounds nitrogen per acre, 17.15 barrels per acre; 40 pounds nitrogen per acre, 19.53 barrels per acre; no phosphorus, 15.52 barrels per acre; 20 pounds phosphorus per acre, 17.56 barrels per acre; and 40 pounds phosphorus per acre, 18.11 barrels per acre. There was no significant difference of yield between the 20-pound application and the 40-pound application of phosphorus.

The average yield for the area where the water was removed five days after seeding was 15.4 barrels per acre. Where the water remained on the area until harvest the average yield was 18.7. This difference in yield was highly significant.

Top-Dressing—An experiment was conducted during 1950 to determine the effect on the yield of Rexoro rice, which had been fertilized at seeding with 250 pounds of 6-8-8, from the top-dressing application of different amounts and combinations of nitrogen, phosphorus, and potassium. The field design was a randomized factorial test which included two rates of nitrogen (0 and 25 pounds of N per acre), two rates of phosphorus (0 and 20 pounds of P_2O_5 per acre), and two rates of potassium (0 and 20 pounds of K_2O per acre).

Nitrogen was the only element which gave a significant increase in rice yields. Phosphorus and potassium top-dressing applications did not affect the yield. The plots which received no nitrogen made an average yield of 12.70 barrels per acre. The plots which received 25 pounds of nitrogen as top-dressing produced an average yield of 15.66 barrels per acre.

—R. J. MIEARS, M. B. STURGIS, AND R. K. WALKER.

Fertility Studies: Forage Crops

The Effect on the Yield of Forage Crops from the Application of Different Amounts and Combinations of Nitrogen, Phosphorus and Potassium—Improved pastures are becoming increasingly important to the rice farmers of Southwest Louisiana. Fertilizer experi-

ments on several different crops were begun during 1950 to determine the fertility requirements of the rice belt soils for maximum forage yields.

Kobe Lespedeza—Fertilizers were applied as top-dressing to Kobe lespedeza which had been seeded in rice stubble without seed-bed preparation or fertilization. The field design was a randomized factorial which consisted of two rates of nitrogen (0 and 20 pounds of N per acre), three rates of phosphorus (40, 80, and 120 pounds of P_2O_5 per acre), and three rates of potash (0, 40, and 80 pounds of K_2O per acre).

Both nitrogen and phosphorus applications gave a significant increase in yield. Potash applications gave no significant difference in yields. The average yield increases from the application of nitrogen and phosphorus were: no nitrogen, 3,382 pounds per acre; 20 pounds of nitrogen per acre, 3,728 pounds per acre; no phosphorus, 2,814 pounds per acre; 40 pounds of phosphorus per acre, 3,679 pounds per acre; 80 pounds of phosphorus per acre, 2,753 pounds per acre; 120 pounds of phosphorus per acre, 4,235 pounds per acre.

Other Forage Crops—Several other fertilizer experiments were initiated during 1950 on which forage yields will be measured. The forage crops in these experiments are: oats, rye grass, fescue and crimson clover mixture, fescue and alsike clover mixture, rye grass and alsike clover mixture, oats and crimson clover mixture, and oats and alsike clover mixture.

—R. J. MIEARS, D. E. BLACK, M. B. STURGIS, AND R. K. WALKER.

Pasture-Rice Rotation—The pasture-rice rotation experiments were continued in 1950 and continue to show the high value of improved pastures for increasing beef yields and increasing rice yields following improved pastures. There were four locations of these experiments in various stages of completion on the different soil types of the rice area. One experiment was completed at the Joe Zaunbrecher farm, Gueydan, La., and the second consecutive rice crop following three years of improved pasture produced 14.91 barrels per acre while the check pasture produced 10.26 barrels. The first year rice crop following three years of improved pasture at Karl Goebbel's farm, Elton, produced 25.0 barrels per acre while the check pasture produced 20.6 barrels per acre.

Beef yields on second year improved pastures at E. O. Daughenbach's farm, Lake Charles, were 265 pounds per acre as compared to 73 pounds produced on the check pasture. First year improved pastures on the new Rice Experiment Station produced 126 pounds of beef per acre as compared to 49 pounds for the check pasture.

Winter Grasses and Legumes—Sixteen winter grasses and 51 winter legumes were planted Oct. 23, 1948, for observation to determine their general adaptability to the rice area. After two years of

observation the data indicate that the following summary may be made: Ten strains of red clover and seven strains of crimson clover made excellent growth on a well-drained and well-fertilized seed-bed. Seed production was good on all strains, and a volunteer stand was obtained the following year on all strains except common crimson clover. None of the 10 strains of alfalfa produced enough forage nor showed enough perennial or reseeding qualities to warrant further study. They are not considered to be generally adapted to the rice area. All Louisiana polycross white clover strains were outstanding in earliness, forage production, seed production, perennial tendency, and reseeding qualities. They appeared to be superior to Ladino clover. Lappa clover, Ball clover, and Persian clover made good growth and seed production and were excellent in reseeding. They were very poor in heat resistance, and forage had disappeared almost completely by May 15. Broom grass (Harlan) and rescue grass made a good growth during the first year, but heat resistance, perennial tendency, and reseeding qualities were very poor. Six strains of fescue grass made a poor growth both years. Of the six strains, Kentucky fescue 31 appeared to be the best. Camellia oats made the best growth and apparently would be more suitable for grazing than any of the other 15 strains and varieties of winter grasses tested.

White Clover—Six strains of white clover were planted Oct. 28, 1949, to determine which were more suitable to the rice area. They were rated or scored for rate of growth, rate of bloom, and heat resistance. Forage yields were taken by clipping. The Louisiana synthetics No. 1 and No. 2 were very outstanding in forage production and had the best heat resistance and rate of growth. Ladino clover and white clover (Wisconsin grown) were very poor in rate of bloom and forage production.

Lespedeza—Seven new strains of lespedeza were planted along with Kobe and Korean to determine their adaptability to the rice area. Yields were taken by clipping. Strain FC 31843 made the highest yield and out-produced Kobe by 30.6 per cent. This is considered very significant because Kobe is the standard variety used in this area.

Seed Production—Sixteen hundred and fifty pounds of strain B-230 Dallis grass seed were harvested and made available to farmers in this area for further increase. Fifteen acres of Louisiana Synthetic No. 1 white clover were planted to increase seed supplies.

—D. E. BLACK AND R. K. WALKER.

Rice Breeding and Varieties

The objective of the rice improvement work of the Rice Experiment Station is to develop and make available to growers better

medium and long-grain varieties of early, midseason, medium-late and late maturity. Growers especially desire early-maturing varieties, and long-grain types bring a higher price. Disease resistance, adaptation to the combine-drier method of harvesting, yielding ability, milling quality, and cooking quality are other important factors considered in the breeding of improved varieties.

The experiments in 1950 were much the same as in previous years, including crossing, selection of pure lines, genetic research, nursery row plot and drill-strip field plot testing of promising selections in comparison with standard varieties, and increasing pure seed. Except for some miscellaneous strain tests and disease experiments, the field work was moved to the new Rice Experiment Station farm northeast of Crowley. No outfield plot work was conducted in 1950.

Twenty-six varieties and strains were tested throughout the five-year period, 1946-50. Outstanding yields were indicated for Lacrosse, Blue Rose x (Rexoro-Blue Rose) selections 3-I-9-2-4 and 6-I-25-12, and Rexoro x Purple Leaf selection 3-72-3. Satisfactory yielding ability was indicated for all other varieties except Blue Rose and Delrex. The five-year average yield for all 26 varieties was 12.7, or 1.7 barrels higher than the average for the entire Louisiana rice crop for the same period, indicating that the tests were conducted under typical rice growing conditions.

Three unnamed promising varieties were grown by farmers in field trials to provide material for tests for milling quality on a commercial scale, and to determine the reaction of farmers and rice buyers to these new varieties. These varieties were:

(1) Blue Rose x (Rexoro-Blue Rose), selection 6-I-25-12. This selection is a few days later than Blue Rose. It has the disease resistance, stiff straw, smooth hull, and uniform maturity necessary for successful combining and drying. The grain is of Blue Rose type but somewhat smaller. This selection is gaining favorable response from both growers and millers, but has not been released because of insufficient information about milling quality and the market trend away from medium-grain rice.

(2) Rexoro x Purple Leaf, selection 3-72-3. This selection is shorter strawed and about 10 days earlier than Rexoro. It is susceptible to stem rot and Cercospora but has given excellent results especially on the darker soils. Since the grain is more plump than that of Rexoro or Bluebonnet, it does not fall into any class familiar to the trade, and a market outlet has not been established. Enough lots have been milled commercially, however, to draw attention to its high milling quality. The head-rice out-turn has ranged from 85 to 94 pounds. In cooking quality it is equal to the finest flaky long grain.

(3) Rexoro x Delitus, selection B321B40-3, is a flavored (aro-

matic or scented) variety of much higher yielding capacity than Delrex. The grain is somewhat chalky and does not mill so well as Delrex. It matures about 10 days earlier than Rexoro.

Other selections of special interest include:

(1) Rexoro x Zenith. Several long grain types of Zenith maturity and with vigorous growth have been selected.

(2) Selection 4-II-1-8 from Rexoro-Blue Rose. A selection that matures with or is slightly earlier than Bluebonnet. It appears to be superior to Bluebonnet in producing better stands and in Cercospora resistance and uniformity of maturity, and in having a slightly more slender grain. It is slightly taller than Bluebonnet, and the straw is more slender. Under ordinary conditions, however, it appears to remain standing until mature. Apparently it has some resistance to stem rot. The smaller straw diameter may be of some advantage in reducing borer damage.

(3) Backcross Rexoro selections. (a) Rexoro² x (Rexoro-Blue Rose), selection 7/8-Rex. 3-12, a second backcross that is very similar to Rexoro. Being resistant to Cercospora leaf spot, its leaves do not turn brown but remain green until after the grain is fully mature. It is slightly shorter strawed than Rexoro. (b) Rexoro³ x (Rexoro-Blue Rose), 15/16-Rex.-3-22 selections. These are third backcross selections with resistance to Cercospora leaf spot, but otherwise indistinguishable from Rexoro.

Four of the nine named varieties reported in production in Louisiana in 1950 were released from the Rice Experiment Station. Nearly 33 per cent of the rice acreage was seeded to these four varieties, Rexoro representing 24.2 per cent, Magnolia 4.3 per cent, Fortuna 3.4 per cent, and Nira .96 per cent of the total state acreage. Rexoro (including a small acreage of Texas Patna) was in second place, and the acreage seeded was the largest ever devoted to this variety. In Texas, Rexoro and Texas Patna combined ran a close second to Bluebonnet, the leading rice variety in that state.

—NELSON E. JODON.

Southeast Louisiana Dairy and Livestock Experiment Station, Franklinton

H. D. ELLZEY, JR., *Superintendent*

B. D. NELSON, *Assistant Dairyman*

Pasture Studies with Dairy Cattle

Summer Pastures—The following summer grazing crops were under study: 1. Sweet Sudan in 36-inch rows. 2. Sweet Sudan broadcast. 3. Sweet Sudan and soybeans broadcast. 4. Sweet Sudan and Alyce clover. 5. Cat-tail millet broadcast.

All pastures were fertilized with 300 pounds of 6-8-8 at planting time and top-dressed with 32 pounds of nitrogen per acre. Each of these pastures caused the animals to produce more milk per day



Part of the station's herd of registered Jersey cows grazing a Dallis grass-common lespedeza pasture in August, 1950. This pasture was fertilized with 400 pounds of 20 per cent superphosphate, 100 pounds of 50 per cent potash, and 100 pounds of ammonium nitrate. Sufficient lime was applied to raise the pH to 6.5. Dallis grass was seeded at the rate of 20 pounds per acre and common lespedeza at the rate of 10 pounds per acre. All operations—seedbed preparation, fertilization, and seeding—were carried out during the latter part of March and the early part of April, 1950. These pastures constitute part of a series of management studies currently under way.

than the animals on a Dallis grass-lespedeza permanent pasture.

Sudan grass, broadcast, produced slightly more milk than Sudan in rows, and since it is more expensive to plant Sudan in rows, this procedure is of doubtful merit. Sudan and soybeans, broadcast together, produced slightly less milk than Sudan in rows. These crops when broadcast do not appear to be good companion crops.

Cat-tail millet was the most outstanding summer grazing crop under trial, producing 400 pounds more milk than any other crop in the test.

Winter Pastures—Experiments involved the following: 1. Oats alone, animals removed March 1, 1950, and pastures overseeded with Kobe lespedeza. 2. Oats alone, continuously grazed as long as growth

permitted. 3. Oats-hairy vetch. 4. Rye grass-crimson clover. 5. Oats-crimson clover (poor stands obtained and therefore discontinued). 6. Rye grass on Dallis grass sod. 7. Kentucky 31 fescue on Dallis grass sod. 8. Crimson clover. 9. Dry lot (control); animals fed legume hay free choice and allowed to forage a native carpet grass pasture; silage was fed at rate of 30 pounds per day per animal.

All pastures were fertilized with 500 pounds of 6-8-8 at planting time. Thirty-three pounds of nitrogen were applied every 45 days for a total of three applications. The crimson clover was not fertilized inasmuch as it followed Alyce clover which had been fertilized with 500 pounds of 3-12-12.

Grazing periods for the various crops were as follows: Oats-vetch, Dec. 1-May 3; oats alone, Dec. 1-April 19; rye grass-crimson clover, Dec. 1-April 19; Kentucky 31 fescue on sod, Dec. 1-April 12; rye grass on sod, Dec. 1-April 12; crimson clover, March 1-May 10; control, Dec. 1-May 3.

There was little difference in the return per acre above feed and pasture costs for the following treatments.

1. Oats grazed until March 1, animals then transferred to crimson clover—\$95.77.

2. Rye grass-crimson clover—\$95.69.

3. Oats-hairy vetch—\$94.85.

Rye grass on sod was a close fourth, having a net value of \$90.25 per acre. As was true in previous years, the rye grass caused the animals to produce more milk per animal while carrying slightly fewer animals per acre. Oats-hairy vetch, as in previous years, was a more consistent performer inasmuch as the level of production was fairly constant throughout the 154-day period.

In all cases where a legume was seeded with a grass, it appeared that the legume was contributing little to the total amount of forage available. At the same time, however, the legume-grass combinations produced more milk than the grass alone.

Oats alone, grazed as long as growth permitted, was the fifth most profitable winter pasture, having a net worth of \$66.05 per acre.

Kentucky 31 fescue was the least profitable winter pasture, having a total net worth of \$30.75 per acre. Since fescue usually does better the second than the first year and is a perennial, thereby eliminating recurring seed and seedbed preparation costs, it should not be judged too severely at this point.

Data from the control group forcibly demonstrate the value of winter pasture. The per-cow return above all costs for the control group was \$18.87 for a 154-day period as compared to a per-cow return of \$143.01 above all costs for rye grass-crimson clover for a 140 day period.

—H. D. ELLZEY, JR., AND B. D. NELSON.

Yield Testing—A total of 24 open-pollinated and hybrid corns having a yield range of 15-30 bushels per acre was included in this test. The top yielding entries were generally the same as in previous years, i.e., Dixie 22, Dixie 17, Funk's G-714A, Funk's G-790W, and Funk's G-780W. The two Dixie hybrids continued to produce a low quality corn and are therefore of extremely questionable merit.

—H. D. ELLZEY, JR., AND HUGO STONEBURG.

Nitrogen X Spacing—Spacings varied from 12 inches to 30 inches in 6-inch increments. Total nitrogen application varied from 30 pounds to 158 pounds in 32-pound increments. In no instance did the application of 158 pounds of nitrogen produce a greater yield than the 126-pound application. This was true regardless of spacing. Also, in no instance for any given spacing, did the addition of 32 pounds of nitrogen significantly raise the yield over the next lowest nitrogen level. Only when there was a difference of 64 pounds in the level of nitrogen fertilization was there a significant difference in yield evidenced for a given spacing.

A 24-inch spacing, with 30 pounds of nitrogen applied at planting and 64 pounds applied as a side-dressing, appears to be the most desirable procedure for applying the nitrogen portion of the fertilizer mixture.

—H. D. ELLZEY, JR.

Fertilization—This test was conducted as in the past, i.e., nitrogen, phosphorus, and potash were varied in 4 per cent increments from 0 to 12 per cent. All fertilizers were applied at the rate of 600 pounds per acre and each treatment was duplicated in order that a 48- and 72-pound nitrogen side-dressing could be made. The need for phosphorus was forcibly demonstrated in this experiment in that absolutely no corn was produced where phosphorus was omitted. This was true even when nitrogen and potash were applied in fairly liberal amounts. As would be expected in soils having a low phosphorus content, the quality of corn was very poor for those treatments providing a low phosphorus level. Little response was obtained from the application of potash; the difference in yield between an 8-8-0 and 8-8-12 was only slightly greater than that necessary to effect a highly significant difference.

Six hundred pounds of an 8-12-8 per acre side-dressed with 72

¹ All corn experiments occupied a tract of land that was cleared of shrubs, trees, stumps, etc., during the fall of 1949. These experiments, therefore, represented the first crop of any kind ever planted on this tract. So-called "new ground" in this area, in contrast to "new ground" in other areas, is exceptionally infertile and the plant food therein is largely unavailable. Physical structure is also very poor. It might be said that the soil is largely sterile from a crop production point of view. For these reasons, yields were abnormally low and responses, in many cases, were abnormal or unlike those that might be obtained on similar soil that has been in cultivation three or more years.

pounds of nitrogen gave the highest yield. This same treatment also produced the greatest yield in last year's experiment.

—H. D. ELLZEY, JR.

Tung Meal as a Fertilizer Material—This test, inaugurated last year, was continued with some modification. The total amount of nitrogen applied to all treatments was 70 pounds, plus 24 pounds each of phosphate and potash. Of the 70 pounds of nitrogen, 0, 17, 35, 52, and 70 pounds came from tung meal. In all instances the yields produced by those treatments obtaining part or all of their nitrogen from tung meal were significantly greater than the yield from the treatment where all of the nitrogen was supplied from commercial sources. There was no significant difference between those treatments obtaining part or all of their nitrogen from tung meal. This would indicate that tung meal, as is true for most organic fertilizer, is slightly superior, pound for pound of nitrogen, to some of the commercial carriers.

Tung meal should not be used alone, as it does not contain sufficient phosphate for profitable yields. This is evidenced by the fact that 2,000 pounds of tung meal (contains approximately 70 pounds of nitrogen) per acre plus 24 pounds of potash, but no phosphate, produced only one-third as much corn as the treatment wherein 24 pounds of phosphate were added to this mixture. The addition of potash only to the tung meal did not affect the yield of corn.

—H. D. ELLZEY, JR., AND W. J. PEEVY.

Calf Feeding

The purpose of this experiment was to determine whether the amount of milk fed calves according to the "Cornell system" could be reduced without adversely affecting the calves. Accordingly, two groups of seven calves each were fed milk as follows:

		Weeks of age										
		1	2	3	4	5	6	7	8	9	10	
Group I	Lbs. of milk daily	5	6	7	7	6	6	5	4	3	3	Cornell System
Group II	Lbs. of milk daily	5	6	7	6	5	4	3	2	0	0	Modified Cornell System

Calves fed according to the modified Cornell system consumed 98 pounds less milk. Except for the amount of milk fed, all calves were handled alike.

Calves in group I made a total gain of 71 pounds in 12 weeks, or an average daily gain of .85 pound. Calves in group II made a total gain of 65 pounds in 12 weeks, or an average daily gain of .77 pound.

Each calf in group I consumed an average of 131 pounds of grain as compared to 135 pounds for the calves in group II. There was no apparent difference in the amount of hay consumed.

The calves in group II gained an average of 26.5 pounds from 8 to 12 weeks of age, the period when no milk was being fed, whereas

the calves in group I gained an average of 29 pounds and received milk for two of these four weeks. None of the calves in group II appeared to be stunted at any time during the experiment. All calves are now one year old and it is impossible to determine which calves composed the two groups.

Follow-up experiments are now in progress to determine whether the amount of milk can be further reduced and to what extent skim milk powder can be used to substitute for whole milk.

—B. D. NELSON, J. B. FRYE, JR., AND H. D. ELLZEY, JR.

Alyce Clover

Fertilization—In this experiment phosphate and potash were varied from 0 to 24 per cent in 6 per cent increments. These elements were applied separately, with each other, and with 3 per cent nitrogen. All treatments were at the rate of 600 pounds per acre. Per-acre green weight yields varied from 704 pounds where no fertilizer was applied to 12,016 pounds where 600 pounds of 0-24-12 were applied per acre. No response was obtained from the application of nitrogen inasmuch as 600 pounds per acre of a 3-12-12 produced 12,001 pounds of forage. Little or no response was obtained from the application of potash, as evidenced by the fact that 600 pounds of a 3-12-0 produced 9,690 pounds of forage as compared with 9,571 pounds from the same amount of 3-12-12 and 9,697 from an 0-12-12.

—H. D. ELLZEY, JR.

West Louisiana Experiment Station, DeRidder

C. B. ROARK, *Superintendent*

HAROLD E. HARRIS, *Research Associate in Agronomy*

The West Louisiana Experiment Station is a pasture and livestock station located on Highway 171, eight miles north of DeRidder and two miles north of Rosepine, in Vernon Parish. This is in the cutover pine lands of west Louisiana.

This report deals with the third year's operation on this station. Since the first year was devoted to clearing, fencing, and building, this is a report of the second year of experimental work.

Land Use

The soils of this area are light. The main soils on the Station are Bowie, Beauregard, and related soils. The topography is rolling. These light soils with rolling topography erode rapidly if left exposed to the weather without cover.

One of the best means of using the land of this area is for the

production of pine forest products. This is the long-time point of view. For the immediate future, improved pastures grazed by good quality livestock of the ruminant class, is a sound type of farming. The primary feed for cattle is pasture and roughage; therefore this area is adapted to the production of cattle.

Pastures for Beef Cattle

An experiment using different combinations of pasture plants was established on five pastures fenced separately. In 1948, the first



This white clover, Dallis grass and rye grass pasture at the West Louisiana Experiment Station gave a yield of 442 pounds of beef per acre during 1950.

year these pastures were seeded, they were limed and treated with a mixture containing 40 pounds of nitrogen, 80 pounds of P_2O_5 , and 40 pounds of K_2O per acre. Basic slag was the source of one-half of the P_2O_5 used.

In 1949 the treatment was a mixture containing 15 pounds of nitrogen, 60 pounds of P_2O_5 and 60 pounds of K_2O per acre. Yields of beef per acre in 1950 were as follows for the five respective pastures:

The pasture containing a combination of Dallis grass and Louisiana white clover with rye grass seed broadcast in the fall of 1949, gave a yield of 442 pounds of beef per acre during the period from Jan. 14 to Nov. 1.

The pasture containing Kentucky 31 fescue and Louisiana white clover gave a yield of 370 pounds of beef per acre when grazed between Jan. 14 and July 1 and during the month of November.

Louisiana white clover and Dallis grass pasture made a yield of 337 pounds of beef per acre from Jan. 14 to March 1 and from June 1 through October.

Summer pasture containing Dallis grass and common lespedeza gave a yield of 212 pounds of beef per acre during the period from May through October.

The pasture containing oats and Singletary peas produced a yield of 172 pounds of beef per acre during the period January through February and during the last half of April.

The above yields were made during the year 1950, following an unusually mild winter, and the rainfall was favorable until mid-July. However, grazing was cut short in the fall because of dry weather and an early, cold winter.

Weather Data

The annual rainfall was about normal, 53.10 inches, but 42.15 inches fell during the first half of the year and only 10.95 inches the last six months. According to weather records over a period of years, the rainfall for the first six months normally exceeds that of the last six months by less than 3 inches. During 1950 the rainfall for the first six months was almost four times as heavy as it was during the last six months of the year.

Methods of Planting Dallis Grass

An experiment to determine the comparative results of different methods of planting Dallis grass was established in 1949 and additional data obtained in 1950. The accumulative results of this experiment to date show the best method of planting Dallis grass to be one in which the seeds are rolled into a firm, well-prepared seedbed with a cultipacker seeder. The second best of the five methods tried was where seeds were broadcast during March in oats and white clover pasture that had been established on a thoroughly prepared seedbed the previous fall, and on which cattle were grazing at the time the Dallis grass was sown.

Soil Erosion Control

When native grass lands are plowed and converted to improved pastures on rolling light soils, there is often severe loss of top soil from heavy rains before a new sod is formed, even though the land is adequately terraced. To prevent this soil loss and to avoid the construction of terraces on land to be sodded to thick growing grasses and legumes, a method of establishing pasture in alternate strips similar to strip cropping is being used. The strips are established in 30-foot widths running generally across the slope, but not necessarily on exact contour.

The 30-foot strip of native range grass left undisturbed holds the soil from severe washing until a new sod is formed on the adjoining plowed strip. The small amount of soil that does start washing



The strip of white clover sod on the left prevents erosion while a sod is being established by the young plants in the strip on the right.

is immediately caught and held in place by the old native grass when it reaches the native sod strip.

After the new strips of pasture are established with a good cover of sod, the remaining strips of range grass are plowed and seeded the following year.

Varieties and Strains of Forage Crops

A nursery containing 83 varieties or strains of summer and winter forage crops serves as a basis for larger seed increase plots.

White Clover—A forage yield trial of six strains of white clover was conducted. All strains were replicated four times. The Synthetic 1 and certified Ladino extended over the longest growing period.

Red Clover—Three strains of red clover were used in a forage yield test. The highest yield was obtained from Synthetic 1, followed by Synthetic 2 and common.

Warm Season Plants—Summer growing plant tests include four

varieties of lespedeza and three varieties of Sudan grass, also several varieties and strains of grasses new to this area.

Poultry

Egg production is one of the livestock enterprises of this area. This enterprise is generally conducted on more of a factory basis than a farm basis.

Chickens are primarily grain consuming livestock, and since grain production in this area is on a limited scale, baby chicks and feed, the raw materials, are purchased and eggs are the finished product. Small farm units and a healthful climate are two major factors that influence the poultry enterprise in this area.

This project consists of a laying flock, starting with approximately 1,000 pullets. It is planned to run this same flock through the second year, comparing production of pullets this first year with production of the same flock in their second year.

U. S. Department of Agriculture

Results of Research Against Insects Attacking Cole Crops in 1950¹

Small-plot field experiments and laboratory experiments with various synthetic organic insecticides for the control of caterpillars attacking cabbage were conducted in the spring of 1950. Allethrin proved less effective than pyrethrum at comparable strengths in both laboratory and field experiments. Aldrin at 1 pound and dieldrin at 0.2 pound in 100 gallons of water were not effective in the field. 1,1-bis (p-chlorophenyl) propane and 1,1-bis (p-chlorophenyl)-butane at the rate of 1 part to 800 parts of water killed all the caterpillars in the field and these insecticides at 1 part to 1,600 parts of water reduced the caterpillar population 90 per cent.

In an experiment on the control of the turnip aphid on fall-grown mustard, dust mixtures containing 0.5 per cent of rotenone plus 2 per cent of piperonyl butoxide, piperonyl cyclonene, or methylated naphthalene or 1 per cent of n-propyl isome were about equal in effectiveness to a 1 per cent rotenone dust. These dusts were more effective than dusts containing 0.25 per cent of rotenone plus 1 per cent of piperonyl butoxide or methylated naphthalene or 0.5 per cent of n-propyl isome.

One application of 0.5 pound of an insecticide containing 27 per cent of O-ethyl O-p-nitrophenyl benzenethiophosphonate in 100 gallons of water per acre and a 25-per cent 1,1-bis (p-chlorophenyl)-butane emulsifiable solution at 1 part to 800 parts of water gave 37 and 58 per cent control, respectively, of the turnip aphid on heavily infested mustard plants.—K. L. COCKERHAM AND P. K. HARRISON.

Results of Sweet Potato Weevil Investigations During 1950¹

A 20 per cent toxaphene dust at the rate of 20 pounds per acre and an emulsion spray at the rate of 3 pounds of DDT in 16 gallons of water per acre, applied five times at three-week intervals, were the most effective insecticides tested against the sweet potato weevil in field plots. The toxaphene reduced the weevil infestation 76 per cent and was significantly better than the untreated check. The DDT reduced the weevil infestation 40 per cent, but this reduction was barely significant as compared with the check. Dusts containing 10

¹ In cooperation with the Louisiana Agricultural Experiment Station.

per cent of chlordane or 20 per cent of DDT, applied at the rate of 20 pounds per acre, were not effective.

Neither a dust nor an emulsion containing DDT applied to sweet potato plants at the rate of 3 to 5 pounds of technical DDT per acre gave a satisfactory kill of adult weevils confined on the plants in cages immediately after the treatment, nor did these treatments protect the vines from subsequent weevil infestation.

The mixing in the soil of DDT at the rate of 100 pounds, chlordane at 20 pounds, or aldrin, dieldrin, or 1,1-bis(p-chlorophenyl)-butane at 5 pounds per acre did not prevent weevil emergence from seed sweet potatoes bedded in the treated soil or prevent infestation of the plants produced by these seed potatoes.

Dusts containing 10 per cent of DDT or 10 or 50 per cent of methoxychlor applied to the interior surfaces of wooden cages in July, 1949, continued to be effective against sweet potato weevil adults placed therein at monthly intervals throughout 1950. The 10 per cent DDT and 50 per cent methoxychlor were somewhat better than 10 per cent methoxychlor, the knockdown being quicker and the total weevil mortality slightly greater.

The herbicide 2,4-D continued to be effective in eliminating volunteer plants in fields and the surplus plants in old seed beds and mother rows. The amine and sodium salts of 2,4-D were equally effective and standard (0.1 per cent) dilutions were equal to those twice as strong. One application destroyed all treated plants. In a replicated small-plot field test more than 99 per cent of the plants and 93 per cent of the seed sweet potatoes were destroyed. One application of the amine salt of 2,4-D on volunteer plants growing in a corn field, when the corn was from 2 to 3 feet high, caused rather serious injury to the corn. Many of the corn stalks fell over and the roots were seriously affected. However, the yield of the corn crop was not reduced by this injury. As a result of the work conducted during 1950 and preceding years, 2,4-D is being recommended for use as a herbicide in all weevil-infested areas.

In tests with new seedlings and varieties for resistance to sweet potato weevils, the seedlings L-187 and L-244 and the variety White Star had the fewest infested sweet potatoes and Oklahoma 24 had the most. In two other plantings where observations were made the seedling L-187 had fewer infested sweet potatoes than the variety Porto Rico. Both seedlings L-187 and L-244 have shown consistently promising results in this respect in previous years.

—K. L. COCKERHAM AND P. K. HARRISON.

Relative Humidity and Temperature Within the Bee Hive

The relative humidity and temperature in two colonies of honeybees at Baton Rouge were determined by the use of a recording hygrothermograph from May 5 to Oct. 20. Both factors were fairly

uniform within the brood nest, but much less uniform in the honey supers. Temperatures in the brood chamber ranged from 88° to 102° F., and in the second honey super from 73° to 106° F. Relative humidities in the brood chamber ranged from 40 to 62 per cent and in the second honey super from 32 to 78 per cent. Results indicate that the greater the distance from the brood nest, the greater was the range of temperature and relative humidity.

Summer honey frequently ferments in the comb within the hive at Baton Rouge. Such honey is high in moisture (18 to 22 per cent) and contains many yeasts. The combination of high summer temperature and high relative humidity probably prevents the bees from properly ripening summer honey. At 90° F. and 90 per cent relative humidity there are 13.3 grains of water vapor per cubic foot of air, while at 70° F. and 90 per cent relative humidity there are only 7.2 grains of water vapor per cubic foot of air. Honey containing 20 per cent moisture absorbs more moisture from the air when the air temperature is 68° F. and the relative humidity is above 60 per cent.

—E. OERTEL.

Cotton Disease Investigations

Research on cotton diseases and methods of control in Louisiana are conducted cooperatively by the Division of Cotton and Other Fiber Crops and Diseases, United States Department of Agriculture, and the Louisiana Agricultural Experiment Station.

The disease projects which are in progress include breeding for bacterial blight resistance, breeding and testing for fusarium wilt resistance, and seed treatment for control of seedling diseases and stand improvement.

Bacterial Blight—Bacterial blight, or angular leaf spot, is most prevalent in the northwestern cotton section of the state. Studies toward developing blight-resistant strains of cotton adapted to Louisiana were begun in 1949. Emphasis has been centered in studying in the field following pure-culture inoculation the reaction of certain hybrids and backcrosses, particularly, Deltapine 14 x Stoneville 20 F_2 from Louisiana, and Stoneville 2-B massed hybrids F_2 and F_3 , F_2 backcrosses of Stoneville 20 x Empire, and Stoneville 20 x Deltapine from Texas. Stoneville 20 (Tenn.) and Stoneville 2-B (Ark.) are the resistant parental lines. In six selections of the Stoneville 20 x Empire backcross, 1 was highly resistant, 1 completely resistant, and 4 were susceptible in 1950. In 8 selections of the Stoneville 2-B F_2 massed hybrids, 3 were highly resistant, 2 completely resistant, and 3 susceptible, while in 7 selections of the same F_3 massed progeny, 3 were highly resistant, 2 completely resistant, and 2 susceptible. Four selections of the Stoneville 20 x Deltapine backcrosses from Texas were completely resistant.

The susceptible population of the F₂ Deltapine 14 x Stoneville 20 was rogued in July following inoculation in June and the resistant plants selfed together with the other resistant lines. Selections were made at harvest for further study of fiber properties. Some of the resistant selections possess good boll size and lint percentage. Determinations for staple length, strength, uniformity, and lint index will be made.

—D. C. NEAL AND F. W. SELF.

Breeding and Testing for Fusarium Wilt Resistance—The breeding program for fusarium wilt resistance was continued along the lines previously reported. Ten selfed strains, 7 hybrids, 1 backcross, and 43 F₂ progenies of Louisiana 33 x Deltapine 14 were planted in progeny rows on wilt-infested soil. Among the 10 strains studied, outstanding for resistance were Coquette W.R., Coker 97, Deltapine 6, Delfos 425-920, and Stoneville 2-B-R. A selection of Delfos 9169 also showed fair resistance. Stoneville 2-B-R, Delfos 9169, and Louisiana 33 also were productive in tests conducted in the Red River Valley section of the state. Among the hybrids, the more promising from the standpoint of resistance, productiveness, and fiber properties are Deltapine 6 x Delfos 6102, Coker 97 x Deltapine 6, and the backcross Deltapine 6 x Delfos 6102 x Deltapine 6.

—D. C. NEAL.

Seed Treatment for Stand Improvement—During the past season comparisons were made at Baton Rouge of dust and slurry treatments of Dow 9-B and Ceresan M. Reginned and acid-delinted Deltapine 15 seed were used. Plantings were made in 50-foot row sections with 6 replications of each treatment together with untreated seed of each seed type. Analyses were made for pre-emergence kill, emergence and seedling survival, and yield. The differences in pre-emergence kill between dust and slurry treatments for both chemicals were not significant; however, the reduction in pre-emergence kill for all treatments was highly significant over the untreated seed. As to emergence and seedling survival, Ceresan M dust-treated seed was highest, the differences over Dow 9-B dust and untreated being highly significant. The Dow 9-B dust failed to give stands significantly better than untreated, but each slurry treatment gave stands that were highly significant over the untreated. There was very little difference between Dow 9-B slurry and Ceresan M slurry.

The highest yield was obtained from Ceresan M dust, the differences over Dow 9-B dust and untreated seed being highly significant. Both slurry treatments did not significantly improve the yield. The results for seed type and treatment showed that only the reginned seed treated with Ceresan M dust gave a significantly higher yield than untreated seed.

—D. C. NEAL.

Regional Tests—Regional seed treatment tests also were conducted at the Red River Valley Station at Curtis and the Northeast

Substation at St. Joseph, the objectives being to determine optimum rates and methods of planting of chemically-treated, reginned and acid delinted cotton seed and their effects on stand improvement and yield. Rates of plantings were 3, 6, and 9 seeds per foot, hill-dropped and drilled. The chemical treatment at each locality was Ceresan M, and the variety at Curtis was Deltapine 15 and the one at St. Joseph, Coker 100 Wilt. Data were collected for plant survival and yield at Curtis and for plant survival at St. Joseph. Plant survival data were not analyzed statistically. At Curtis, the means for reginned and delinted *hill-dropped* seed were practically the same, whereas the mean difference for each seed type drilled was 5.9 per cent higher for the reginned. On the whole, higher survival was attained with the lower rates of planting regardless of the method of planting used. At St. Joseph, the reginned seed gave a better survival than delinted, and with one exception, the lower planting rates gave better stands. Methods of planting had little effect.

The only factor which influenced the yield at Curtis was rate of planting. The 6-seeds-per-foot rate gave the highest yield. The mean yields in pounds per acre for the three planting rates were as follows:

Rate	Pounds per acre	
	Seed Cotton	Lint
3 seeds per foot.....	2357.1	935.7
6 seeds per foot.....	2553.5	1013.7
9 seeds per foot.....	2178.5	864.8
Difference barely significant.....	219.6	87.2
Difference highly significant.....	294.6	116.9

—D. C. NEAL, C. B. HADDON, AND J. Y. OAKES.

Financial Statement

Agricultural Experiment Stations

Research Funds

July 1, 1949 - June 30, 1950

FEDERAL RESEARCH FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones	Hope-Flannagan	
					RRF	RM
Appropriation.....	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$17,700.00	\$85,178.44

EXPENDITURES—FEDERAL FUNDS

Salaries and Wages.....	13,603.19	11,621.34	48,863.70	49,558.97	9,720.06	51,697.57
Supplies and Expense.....	1,254.65	1,744.68	6,822.72	6,533.08	1,705.56	8,856.18
Travel.....	82.16	325.03	2,621.96	1,696.63	747.73	5,136.64
Capital Outlay.....	60.00	1,308.95	1,691.62	8,131.28	1,783.43	17,566.11
TOTAL.....	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$13,956.78	\$83,256.50

EXPENDITURES—STATE FUNDS

	Bankhead-Jones State Offset	State Non-Offset	Other State Funds*	Research Fellowships†	Total All Funds
Salaries and Wages.....	\$ 67,488.34	\$213,985.53	\$361,358.69	\$33,693.30	\$ 675,525.86
Supplies and Expense.....	20,284.43	51,594.25	192,823.34	32,567.52	297,269.54
Travel.....	3,652.78	8,569.22	18,004.45	4,783.36	35,009.81
Capital Outlay.....	9,732.56	22,059.39	226,356.00	2,645.74	260,793.69
TOTAL.....	\$101,158.11	\$296,208.39	\$798,542.48	\$73,689.92	\$1,268,598.90

*Includes appropriations for substations and special Legislative appropriations.

†Does not include funds appropriated for plant expansion.

Agricultural Experiment Station Staff

ADMINISTRATION

W. G. Taggart, M.S., Director
I. L. Forbes, Ph.D., Assistant Director
J. Gordon Gibert, B.S., Administrative Assistant
Lawrence V. George, B.S., Editor
Nathalie Poirier, Executive Secretary
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Frances S. Stoker, Librarian

STATE STATION, BATON ROUGE

AGRICULTURAL CHEMISTRY AND BIOCHEMISTRY

- ¹ E. A. Fieger, Ph.D., Nutritionist; Head of Agricultural and Biochemistry Department
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¹ John Francis Christman, Ph.D., Assistant Biochemist
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Socrates Kaloyereas, Ph.D., Associate Food Preservationist
¹ Jordan Grey Lee, III, Ph.D., Associate Biochemist
Harvey Lewis, Ph.D., Assistant Nutritionist
¹ Allen D. Tillman, M.S., Assistant Nutritionist
¹ Virginia Rice Williams, Ph.D., Assistant Nutritionist

AGRICULTURAL ECONOMICS

- ¹ B. M. Gile, Ph.D., Agricultural Economist; Head of Agricultural Economics Department
¹ William H. Alexander, M.S., Assistant Agricultural Economist
¹ James Milton Baker, M.S., Associate Agricultural Economist
¹ Warner L. Bruner, M.S., Research Associate
Henry J. Casso, M.S., Research Associate
¹ J. Norman Efferson, Ph.D., Agricultural Economist
Alex M. Hodgkins, B.S., Research Associate (resigned Aug. 14, 1950)
¹ James F. Hudson, M.S., Assistant Agricultural Economist
Dallas M. Lea, B.S., Research Associate
Morris M. Lindsey, B.S., Research Associate (resigned July 14, 1950)
¹ Joseph P. Montgomery, M.S., Associate Agricultural Economist
Olin B. Quinn, M.S., Research Associate
Ewell P. Roy, M.S., Research Associate (appointed July 1, 1950)
Richmond O. Slay, B.S., Research Associate (appointed Aug. 14, 1950)
¹ Felix E. Stanley, M.S., Associate Agricultural Economist
Randall Stelly, M.S., Research Associate
¹ Martin D. Woodin, Ph.D., Agricultural Economist

AGRICULTURAL ENGINEERING

Harold T. Barr, M.S., Agricultural Engineer; Head of Agricultural Engineering
Research Department
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John S. Norton, B.S., Research Assistant (resigned Nov. 30, 1950)
Wiley D. Poole, M.S., Associate Agricultural Engineer

ANIMAL INDUSTRY

¹ J. B. Francioni, Jr., M.S., Animal Husbandman; Head of Animal Industry
Department
Charles I. Bray, Ph.D., Animal Husbandman (deceased March 23, 1950)
¹ R. M. Crown, M.S., Associate Animal Husbandman
James F. Kidwell, Ph.D., Animal Husbandman (appointed Aug. 1, 1950)
¹ Swayze E. McCraigne, M.S., Associate Animal Husbandman
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CROPS AND SOILS

¹ M. B. Sturgis, Ph.D., Agronomist; Head of Agronomy Department
Richard L. Arceneaux, B.S., Assistant in Agronomy
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Jack D. DeMent, M.S., Assistant Agronomist
C. T. Dowell, Ph.D., Agronomist (retired)
Bertran N. Driskell, Ph.D., Associate Agronomist
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¹ Merlin T. Henderson, Ph.D., Agronomist
Hugh W. Ivy, Jr., B.S., Assistant Agronomist
Jack E. Jones, M.S., Assistant Agronomist (appointed July 1, 1950)
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¹ Walter J. Peevy, Ph.D., Agronomist
¹ Clarence E. Scarsbrook, Ph.D., Associate Agronomist
Ferd W. Self, M.S., Associate Agronomist
¹ William H. Willis, Ph.D., Agronomist

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¹ Jennings B. Frye, Ph.D., Dairy Husbandman; Head of Department of Dairy
¹ Cecil Branton, Ph.D., Assistant Dairy Husbandman
¹ Alcee J. Gelpi, Jr., M.S., Associate Dairy Technologist
¹ James Edward Johnston, Ph.D., Assistant Dairy Husbandman (appointed
July 1, 1950)
George D. Miller, M.S., Assistant in Dairy Research
² Thomas Everette Patrick, M.S., Assistant Dairy Husbandman
¹ Louis L. Rusoff, Ph.D., Associate Dairy Nutritionist
¹ Eric E. West, M.S., Research Associate

ENTOMOLOGY

C. Egan Smith, M.S., Entomologist; Head of Entomology Research Department
Emile J. Concienne, B.S., Research Associate
Alvan L. Dugas, M.S., Entomologist
Ernest H. Floyd, M.S., Associate Entomologist
Lee Dale Newsom, Ph.D., Assistant Entomologist
John S. Roussel, M.S., Assistant Entomologist
James C. Weber, B.S., Research Associate (appointed Feb. 1, 1951)

FERTILIZER AND FEEDSTUFFS LABORATORY

Ernest A. Epps, Jr., M.S., Chief Chemist and Head of Department
Hugh C. Austin, Jr., B.S., Research Associate
Frances L. Bonner, M.S., Assistant Chemist
Ethel Loyd Claiborne, B.S., Research Associate (resigned Sept. 30, 1950)
William P. Denson, B.S., Assistant Chemist
Jesse L. Farr, M.S., Assistant Chemist (retired)
Joseph G. Kawalczuk, B.S., Research Associate
John B. McDevitt, B.S., Research Associate
Clayton C. Moreland, B.S., Assistant Chemist
John W. Torbert, B.S., Research Associate (appointed Nov. 10, 1950)

FORESTRY

- ¹ Ralph W. Hayes, M.F., Forester; Head of School of Forestry
- ¹ Martin B. Applequist, M.F., Assistant Forester
- ¹ Bryant A. Bateman, Ph.D., Forester
- ¹ A. Bigler Crow, M.F., Assistant Forester
- ¹ Leslie L. Glasgow, M.S., Assistant Forester
- ¹ Charles O. Minor, M.F., Assistant Forester
- ¹ William M. Palmer, M.F., Associate Forester
- ¹ Richard F. West, M.F., Assistant Forester

HOME ECONOMICS

- ¹ Clara Tucker, Ph.D., Head of Department of Home Economics
- Echo P. Cheely, M.S., Research Associate
- Margaret H. Dallyn, B.S., Research Assistant
- ¹ Ray Loree, Ph.D., Associate Home Economist
- ¹ Laureame McBryde, B.S., Research Associate
- ¹ Dorothy S. Moschette, M.A., Associate Home Economist

HORTICULTURE

- ¹ Julian C. Miller, Ph.D., Horticulturist; Head of Horticultural Research Department
- Rita Belle Attaya, M.S., Research Assistant
- Stewart Lamonte Dallyn, Ph.D., Associate Horticulturist (appointed Sept. 1, 1950)
- James F. Fontenot, M.S., Assistant Horticulturist
- ¹ Richard H. Hanchey, M.S., Assistant Horticulturist
- P. Lynwood Hawthorne, M.S., Associate Horticulturist
- Teme P. Hernandez, Ph.D., Assistant Horticulturist (located at Chase, La.)

- August E. Kehr, Ph.D., Associate Horticulturist
- ¹ William Duke Kimbrough, Ph.D., Horticulturist
- John J. Mikell, Ph.D., Assistant Horticulturist
- John C. Noonan, M.S., Research Associate (appointed Aug. 1, 1950)
- ² Raymon E. Webb, M.S., Assistant Horticulturist

PLANT PATHOLOGY

- ¹ St. John Poindexter Chilton, Ph.D., Plant Pathologist; Chairman of Department
- John G. Atkins, Jr., Ph.D., Assistant Plant Pathologist
- Preston H. Dunkelman, M.S., Assistant Plant Pathologist
- Claude W. Edgerton, Ph.D., Plant Pathologist (retired)
- Irvin L. Forbes, Ph.D., Plant Pathologist; Assistant Director of Experiment Station
- Weston J. Martin, Ph.D., Associate Plant Pathologist
- Percy J. Mills, M.S., Research Associate
- ¹ Antonio G. Plakidas, Ph.D., Plant Pathologist
- Ernest R. Stamper, M.S., Assistant Plant Pathologist
- Eugene C. Tims, Ph.D., Associate Plant Pathologist
- Edwin H. Todd, M.S.A., Research Associate (part-time)

POULTRY

- ¹ Charles W. Upp, Ph.D., Poultry Husbandman; Head of Department
- ¹ William Dewey Blackwell, B.S., Research Associate
- ¹ Harry E. Hathaway, M.S., Research Associate
- ¹ Benjamin A. Tower, M.S., Assistant Poultry Husbandman
- ¹ Alva Burl Watts, Ph.D., Assistant Poultry Husbandman
- Ernest Williams, B.S., Assistant in Poultry Husbandry (appointed Aug. 1, 1950)

RURAL SOCIOLOGY

- ¹ Homer L. Hitt, Ph.D., Rural Sociologist; Head of Department
- ¹ Alvin L. Bertrand, Ph.D., Assistant Rural Sociologist
- John N. Burrus, M.S., Research Associate (resigned June 30, 1950)
- ¹ Paul H. Price, Ph.D., Assistant Rural Sociologist
- Irving L. Webber, M.A., Research Associate (appointed Sept. 8, 1950, resigned Jan. 1, 1951)

SUGAR STATION

- Claude B. Gouaux, B.S., Agronomist (located at Lafayette, La.)
- E. C. Simon, M. S., Associate Agronomist

VETERINARY SCIENCE

- ¹ William T. Oglesby, D.V.M., Veterinarian; Head of Department
- ² Charles H. Bridges, D.V.M., Research Associate
- Carol Tucker Ernest, M.S., Research Assistant (resigned Feb. 28, 1951)
- ¹ Robert B. Lank, D.V.M., Associate Veterinarian
- Helen Elizabeth Levy, B.S., Assistant in Veterinary Science
- Roy L. Mayhew, Ph.D., Parasitologist
- ¹ James G. Miller, D.V.M., Assistant Veterinarian (appointed Aug. 1, 1950)

SUBSTATIONS

FRUIT AND TRUCK EXPERIMENT STATION, HAMMOND

Walter F. Wilson, Jr., M.S., Associate Horticulturist; Superintendent
Mike J. Giamalva, M.S., Assistant Horticulturist (appointed Aug. 15, 1950)

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN

Ralph S. Woodward, M.S., Associate Horticulturist; Superintendent
James L. Heath, Jr., B.S., Research Associate in Animal Industry
John C. Taylor, M.S., Research Associate in Horticulture

NORTH LOUISIANA HILL FARM EXPERIMENT STATION, HOMER

Dawson M. Johns, M.S., Associate Agronomist; Superintendent
LeVernon Beaubouef, M.S., Assistant Agronomist (appointed Feb. 1, 1951)
Verlin P. Bennett, M.S., Research Associate in Agronomy (resigned
June 30, 1950)
Thomas Hansbrough, B.S., Research Associate in Forestry (resigned
Sept. 6, 1950)
E. E. Hodgkins, B.S., Research Associate in Dairying (appointed Feb. 1, 1951)
Howard C. Kellgren, B.S., Research Associate in Dairying (appointed Aug. 15,
1950, resigned Jan. 19, 1951)
Robert E. Wright, M.S., Assistant Horticulturist

NORTHEAST LOUISIANA EXPERIMENT STATION, ST. JOSEPH

Christopher B. Haddon, B.S., Agronomist; Superintendent
John C. Carpenter, Jr., M.S., Assistant Animal Husbandman
John A. Hendrix, M.S., Assistant Agronomist
Sherman A. Phillips, B.S., Assistant Agronomist
Russell Y. Ratcliff, B.S., Research Associate in Agronomy

PLAQUEMINES PARISH EXPERIMENT STATION, DIAMOND

Ralph T. Brown, M.S., Assistant Horticulturist; Superintendent
Frederick B. Schmitz, M.S., Assistant Horticulturist (appointed Sept. 1, 1950)

RED RIVER VALLEY EXPERIMENT STATION, CURTIS

Jared Y. Oakes, M.S., Agronomist; Superintendent
Elixis C. Bashaw, B.S., Assistant Agronomist (resigned Jan. 1, 1951)
Lowell L. McCormick, B.S., Assistant Agronomist (appointed Feb. 1, 1951)
Cedric R. Jordan, M.S., Assistant Entomologist (appointed June 1, 1950, resigned
Sept. 15, 1950)
Weldon A. Nipper, M.S., Assistant Animal Husbandman

RICE EXPERIMENT STATION, CROWLEY

Rufus K. Walker, M.A., Associate Agronomist; Superintendent
David E. Black, B.S., Research Associate in Agronomy
Charles Nelson Bollich, B.S., Research Associate in Plant Breeding (appointed
July 1, 1950)
L. George Coonrod, B.S., Assistant Agricultural Engineer
J. Mitchell Jenkins, B.S., Superintendent (retired)

N. E. Jodon, M.S., Associate Agronomist (U.S.D.A.)
Roy Jean Miears, B.S., Assistant Agronomist

SOUTHEAST LOUISIANA DAIRY AND LIVESTOCK EXPERIMENT STATION, FRANKLINTON

H. DeWitt Ellzey, Jr., M.S., Assistant Agronomist; Superintendent
Billy D. Nelson, B.S., Assistant Dairyman (resigned Jan. 31, 1951)
Denis Edward Simon, Jr., B.S., Research Associate in Dairy Husbandry
(appointed March 1, 1951)

WEST LOUISIANA EXPERIMENT STATION, DeRIDDER

Cecil B. Roark, M.S., Associate Agronomist; Superintendent
Harold E. Harris, B.S., Research Associate in Agronomy

UNITED STATES DEPARTMENT OF AGRICULTURE

(Located at State Station, Baton Rouge, La.)

K. L. Cockerham, M.S., Entomologist
Theodore P. Dykstra, Ph.D., Senior Pathologist
P. Kips Harrison, M.S., Entomologist
Otto Mackensen, Ph.D., Apiculturist
Troy H. Mullins, M.S., Agricultural Economist
David C. Neal, Ph.D., Senior Pathologist
Everett Oertel, Ph.D., Apiculturist
Irwin L. Saveson, B.S., Drainage Engineer
Hugo Stoneberg, M.S., Associate Agronomist
Stephen Taber, B.S., Apiculturist
Warren Whitcomb, Jr., Ph.D., Apiculturist, in charge
Finis T. Wratten, M. S., Agent (in Agricultural Engineering)

¹ Part-time teaching.

² On leave of absence.

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Research In Agriculture

ANNUAL REPORT, 1950-51



AGRICULTURAL EXPERIMENT STATION

Louisiana State University



Research in Agriculture

1950-51

ANNUAL REPORT

AGRICULTURAL EXPERIMENT STATION

LOUISIANA STATE UNIVERSITY

AND

AGRICULTURAL AND MECHANICAL COLLEGE

BATON ROUGE, LOUISIANA

W. G. TAGGART, *Director*



Compiled by I. L. Forbes from Reports of Heads of

Departments and Project Leaders

Year Ended June 30, 1951

The Cover

King Cotton still reigns as the number one cash crop in Louisiana but is being pushed hard by the rapidly expanding livestock industry in the state. And the livestock industry, more particularly beef and dairy cattle, is developing in direct proportion to the use of improved pastures.

The two kodachromes reproduced on the cover are of scenes at the Red River Valley Experiment Station near Shreveport. In one, two-bale cotton was produced under recommended Station practices of adapted variety, proper fertilization and spacing, and necessary insect control. In the other scene, grade beef cattle are grazing improved pastures of Louisiana white Dutch clover and fescue grass. A total of 531 pounds of beef per acre was produced during a period of 196 days. This is a new Station, and expanded research on pastures is under way there as well as at a number of the other Stations in an effort to determine scientifically the place of livestock in a well-balanced farm program in Louisiana.

Agricultural Chemistry and Biochemistry

Energy Requirements of Human Beings

Sweet potatoes are an important agricultural crop, not only in Louisiana but throughout the southern region of the United States. They are an excellent inexpensive source of carotene, a precursor of Vitamin A; of energy (calories); and of other nutrients. The utilization of energy (calories) varies, depending upon the individual and the type of diet ingested. Various authorities are of the opinion that in many instances caloric requirements have been overestimated.

In 1949 and 1950 a total of 14 human subjects underwent a controlled metabolism study on the human nutritional utilization of carotene from sweet potatoes. Biological materials from these subjects representing a total of 1056 "subject days" are being used for energy determinations. The mean daily caloric intakes of six of the subjects have been determined by direct calorimetry using an Emerson bomb calorimeter. For the 1950 group, which was composed of two women and four men aged 19 to 25 years, the results showed that the two young women had average daily caloric intakes of 2082 and 2422. The average daily caloric intakes for the four men ranged from 2651 to 3359 calories. For five of the subjects, these values differed by less than ten per cent from the values which were calculated from the body weights. The average daily caloric intakes of all subjects exceeded 85 per cent of the National Research Council's recommended daily allowance; those of three of the subjects met the recommended allowances. Two of the subjects had mean daily caloric intakes which were less than their computed total energy expenditures. As judged by maintenance of body weight, however, there was no indication of caloric deficiency.

—*William H. James, Martha E. Hollinger, Willie Ruth Martin*

Sweet Potato Project

During the past two years an investigation has been made on the effects of variety, planting date, and harvest date on the moisture, ascorbic acid, and carotene content of sweet potatoes. This work is part of a cooperative project undertaken by several experiment stations in the South.

During both seasons planting date had no effect on the moisture, ascorbic acid, or carotene content of sweet potatoes. In the 1950 season the potatoes from the third harvest period showed a significant increase in moisture. This was not observed in 1951. Harvest date within plantings showed significant effects on the carotene content of the potatoes in both seasons. There were small increases in the amount of carotene with the later harvests.

Varietal differences were most outstanding of all the factors studied. This is shown in the following table, which gives the means for the 1951 season.

Variety	Moisture Per Cent	Dry Weight Basis	
		Ascorbic Acid mg/100 gm.	Carotene mg/100 gm.
Porto Rico Unit I	67.2	79.4	13.6
L 241	71.9	95.6	45.1
All Gold	72.5	87.6	49.8

—*E. Anne Andrews, Harvy Lewis, E. A. Fieger*

Experimental Lathyrism Produced By Feeding Singletary Pea Seed

The classical lathyritic picture in the rat is one of skeletal deformity and paralysis. We have found that the skeletal deformity can be prevented although the paralysis cannot. The inclusion in the experimental ration of substantial quantities of casein consistently minimizes the skeletal deformity and promotes growth. Supplementation with pure amino acids singly or together has not totally reproduced this preventive effect. A combination of lysine, methionine, and tryptophane has been the most effective of the supplements tried to date. The inclusion of hydrogenated fat also aids in preventing the skeletal changes but has no effect on growth. Variation in carbohydrate has no significant effect.

Attempts at isolating the causative factor using stratigraphic techniques led to total or almost total loss of activity. Reassessment of the procedures used has shown that as inactive material is removed the toxic factor becomes progressively more sensitive to heat in alcoholic solutions. This sensitivity is enhanced even by such weakly active adsorbents as Celite. This reassessment has also emphasized that the solvent of choice is methanol rather than water or ethanol. —*H. Rolfs, H. P. Dupuy, and J. G. Lee*

Biotin and Oleic Acid in the Nutrition and Metabolism of Microorganisms

A study has been made of the relationship of oleic acid to biotin in the metabolism of certain yeasts. The growth of *Saccharomyces cerevisiae* (Java) was stimulated by oleic acid on biotin-deficient sucrose medium in the presence of aspartic acid. When incubated for at least 72 hours *S. cerevisiae* (Java) eventually achieved good growth in biotin-deficient medium. Analyses of cells and media showed that the microorganism had synthesized biotin.

Experiments of a similar nature with *Lactobacillus casei* showed that this microorganism as well can synthesize traces of biotin when grown on a biotin-deficient oleic acid medium.

Glucose, fructose, or hydrolyzed sucrose could not be substituted for sucrose as a carbohydrate source for the reproduction of *S. cerevisiae* (Java) in a biotin-free system. From this observation it might be inferred that biotin is unequally related to carbohydrate metabolism. Stimulation of glucose utilization was observed when biotin or biotin with adenylic acid was added to cells of *L. casei* grown on a low glucose medium in the presence of oleate. The rate of glucose utilization by cells of *S. cerevisiae* 139 grown on a high biotin medium was found to be considerably higher than that of cells grown on a low biotin medium. A linkage of biotin to hexokinase function has been postulated but has not been demonstrated. All active preparations of hexokinase so far obtained have not been sufficiently purified with respect to biotin.

—*E. Anne Andrews, Virginia R. Williams, John F. Christman*

Studies on the Coenzyme of Aspartic Acid Deaminase

The coenzyme of aspartic acid deaminase has been synthesized from a variety of substances, the most important of which are glucose and furfural. The synthesis was accomplished by autoclaving an aqueous solution or suspension of the starting material with sulfuric acid. The properties of the coenzyme have been studied and found to be identical with those of the natural coenzyme present in yeast. Further studies on isolation and identification are in progress.

—*Virginia R. Williams and John F. Christman*

Chromatography and Biological Stains

Recent investigations have been conducted using the process of chromatography in the analysis of biological stains. These

colored substances are extremely valuable to the scientist in the differentiation of cellular material.

It has been found that certain presumably pure fat-staining dyes are effective primarily because of a minor impurity in the sample. Work is in progress to identify this material.

—*John F. Christman, H. J. Werner, and Robert H. Trubey*

Protein Intake and Vitamin Retention by Rats

A preliminary experiment was undertaken to study the effect of the level of protein intake on the retention of B-vitamins by rats. Partially synthetic rations containing 15 and 30 per cent casein were fed to a group of rats, and excretions of pantothenic acid were determined. The rats which received the lower amount of casein excreted a greater proportion of the vitamin ingested than did those receiving more protein. Tissue stores of pantothenic acid and thiamine were not affected by the protein level of the ration. —*Harvey Lewis*

Protein in Rice as Influenced by Variety and Fertilizer Levels

A study was made of the effects of fertilizer treatments on the protein content of rice grown on Crowley silt loam, of the variation in protein content of different varieties of rice, and of the distribution of protein within the varieties and selections now being grown at the Louisiana Rice Experiment Station.

Fertilizer treatments increased the yield of rice but they did not significantly increase the percentage of protein nitrogen. Differences in the protein content caused by soil heterogeneity were observed. Factors which limit normal growth or yield increased the percentage of protein nitrogen. On the basis of all treatments there was no significant correlation between percentage of protein nitrogen and yield of rice. Widely significant differences in the total protein contents of the more important varieties and selections were found. Statistical analysis of the protein distribution in the solubility fractions showed that there were differences among the percentages of the total nitrogen occurring in each fraction. Water-soluble protein was negatively correlated with total protein. Alcohol-soluble and alkali-soluble proteins were positively correlated with total protein. Salt-soluble and insoluble proteins were not definitely related to total protein. Apparently, the inheritance of protein content is complex. Whether or not a high protein variety transmits the high protein characteristic depends also on the variety with which it is crossed. Varietal in-

heritance has more to do with determining protein content than do soil conditions or fertilizer treatment.

—*E. A. Fieger and Frances Sturgis*

Shrimp Studies

Black Spot or Melanotic Shrimp

It has been previously shown (Annual Report 1949-50) that the formation of black spots or melanosis in shrimp was caused by natural enzyme reactions resulting in the production of black or brown melanin pigments. The enzyme has been shown to be fairly nonspecific for it acts upon various related compounds. It is especially concentrated in the head, legs, fins, and antennae and is also present in the shell and membrane separating the shell from the tail flesh. The enzyme is not present in the flesh of the tail.

Substances which combine with copper destroy the enzyme activity and are therefore effective in preventing melanogenesis. Evidence has been obtained indicating a marked species difference in the amount of the enzyme present in the tail shell. Brown shrimp contain the highest amount, while white or green shrimp have the smallest quantity of the enzyme. This order of enzyme content checks well with the known incidence of development of black spot or melanosis in these species in commercial storage.

—*E. A. Fieger and J. J. Friloux*

Frozen Cooked Shrimp

Cooked, peeled shrimp were given various treatments before freezing in an effort to obtain a product which retained color, flavor, and tenderness after a storage of six months at 0°F. Shrimp which had been cooked with a spice mixture were considered edible, although less palatable than fresh cooked shrimp, after storage periods of six months to one year. Rancidity was not detected in shrimp cooked with spice, regardless of the treatment used, possibly because the spice flavor masked any off flavors in the shrimp. The most promising treatment for retarding quality deterioration in frozen cooked shrimp was packing and freezing in cooking liquid or in water. The advantages of this treatment were more noticeable in samples of shrimp cooked without spice.

—*Harvey Lewis*

Aphythatosis

The work on the aphythatosis process of drying foods has been continued this year. A full investigation was carried out on sweet and Irish potatoes and cabbage. The results show that the new process is very advantageous when compared with present

methods of drying foods. Better preservation of the natural qualities and prevention of losses of food value during drying are secured. Preliminary experiments on drying rough rice showed promise. —*Socrates A. Kaloyereas*

Coating of Dried Foods as a Means of Preventing Losses During Storage

Previous investigations showed that the storage life of carrots is prolonged through protection of carotene by the addition of starch to the scalding water. This treatment applied to sweet potatoes also proved successful in preventing losses of carotene during storage. Since the application of starch is associated with the application of heat in blanching or scalding, an attempt to substitute other materials which could be applied at ordinary temperatures was investigated. "Flavorseal," a product used at present as a coating agent for fresh foods, proved to be successful in this respect in preventing losses of carotene and ascorbic acid of dried sweet potatoes and carrots during storage.

—*Socrates A. Kaloyereas*

Dehydrofreezing of Mushrooms

The dehydrofreezing process has been successfully applied to the freezing preservation of mushrooms. The frozen product after thawing has an attractive color, retains its shape, and is very palatable. —*Socrates A. Kaloyereas*

Agricultural Economics

Cotton Ginning and Marketing in Louisiana

Cotton Ginning Cost

A study to determine the more important factors influencing the costs of ginning services in Louisiana and the possibilities for reducing costs of ginning has been made. The study should be beneficial to both present and prospective gin owners in aiding them in making the proper adjustments between volume and plant capacity necessary for maximum operating efficiency.

The per-bale cost of operating items is influenced also by factors other than volume. Labor constitutes a large part of operating costs, and efficient use of labor is essential if substantial reductions in operating costs are to be achieved. Too often the same number of employees required at the peak of the ginning season is used throughout the season. At the beginning and end of the season these employees are idle much of the time. In such cases ginners who have a ready source of labor may find it more economical to operate their gins part of each day or on "gin days." Fuel is another item of operating cost that could be used more efficiently by many ginners.

There was an inverse relationship between the volume per gin stand and cost per bale. Gins with a volume per stand of below 200 bales had a three-year average cost of \$15.85 per bale, while those ginning 700 bales and above per stand had a three-year average cost of \$7.92 per bale.

There was a direct relationship between the size of the gin plant and cost per bale. At a volume per gin of less than 500 bales the cost per bale was \$19.10 for 3-stand and \$24.22 for 5-stand gins. At a volume of 2,500 bales and above the cost per bale was \$9.88 for 3-stand and \$12.08 for 5-stand gins.

The average cost per bale for ginning cotton was \$10.66, \$9.44, and \$10.97 during 1947, 1948, and 1949 respectively. Cost variations between years were due mainly to changes in volume ginned, length of ginning season, and prices paid for operating items. Gins located in the Upland Cotton Area had the highest cost per bale (\$12.29) with an average volume of 882 bales, while the gins in the Mississippi Delta Area had the lowest average cost per bale (\$9.22) with an average volume of 2,134 bales.

The investment required for a ginning establishment is such that adequate volumes are essential for sound and economical operation. The cost of depreciation and interest on investment

per bale varies directly with the volume ginned. For this reason, individuals who plan to engage in the ginning business should ascertain the potential productive outlook in the community and the proportion of the cotton crop that they can expect to gin before deciding on the size of gin plant to be built.

—*R. O. Slay and James F. Hudson*

Cotton Quality Statistics

The Department of Agricultural Economics cooperates with the Cotton Branch of the Production and Marketing Administration in obtaining annual data on the grade and staple length of cotton produced in Louisiana. The production of cotton in Louisiana during 1951 is estimated at 765,000 bales, which is considerably above the 426,000 bales produced in 1950. However, according to cotton quality reports for ginnings through December 12, 1951, the quality of the crop is expected to average somewhat lower than in 1950. The unfavorable weather experienced during the latter part of the harvest season was one of the major factors responsible for this reduction. Middling and better grades accounted for only 44 per cent of the crop in 1951 as compared with 59 per cent in 1950. The largest decrease was in the proportion of cotton grading middling, 35 per cent in 1951 compared with 50 per cent in 1950. The largest increase was in cotton grading low middling, 14 per cent in 1951 and only five per cent in 1950. The proportion of strict low middling cotton also increased considerably, being 36 per cent in 1951 compared with 31 per cent in 1950.

The proportion of ginnings reduced in grade because of rough preparation is expected to be the lowest on record for Louisiana, with only 1.7 per cent of all ginning through December 12 showing rough preparation. For the corresponding period in 1950, 4.5 per cent of the crop was reduced in grade because of rough preparation.

The average staple length in thirty-seconds inches is expected to be shorter for the 1951 crop, 33.8 as compared with 34.1 for 1950 and 33.9 for 1949. Staple lengths of 1 1/32 inches through 1 3/32 inches comprised 94 per cent of the 1951 ginnings as compared with 97 per cent for 1950. The proportion of ginnings 1 1/8 inches and longer decreased slightly and there was an increase in ginnings 1 inch and shorter. The annual data on grade and staple are helpful to both ginners and the cotton trade in marketing the cotton crop. —*James H. Melancon and James F. Hudson*

Cotton Classing and Market News

The Louisiana Agricultural Experiment Station cooperates with the Production and Marketing Administration in providing a free cotton classing and market news service for eligible producers in Louisiana. This service is provided for by a federal law

commonly known as the Smith-Doxey Act, and has been available to Louisiana growers since 1938. The classification certificates together with market price information are valuable marketing aids to growers, enabling them to determine the approximate value of each bale before it is sold. The classification certificates are acceptable in placing cotton in the government loan and in many cases are accepted by cotton merchants in purchasing growers' cotton. The classification data enable the grower to determine the relative merits of different varieties and frequently serve as a guide in picking and ginning operations.

Farmers, to be eligible for the Smith-Doxey service, must belong to an organization which has as one of its purposes the improvement of the cotton grown by its members. Applications were received and approved from 35 such groups in Louisiana during 1951. Through these groups the majority of the producers in the state were eligible to receive free classing and market news service.

The percentage of the total crop submitted for classification under the Smith-Doxey program increased substantially in 1951 over 1950. Through January 11, 1952, a total of 361,520 samples of cotton had been classed for Louisiana growers. This represents approximately 48 per cent of the total ginning for the state whereas in 1950 only 25 per cent of the crop was submitted for classification. Continued educational work among growers and buyers and improvements in the speed and efficiency of rendering the classification service should result in further increases in grower participation. —*James H. Melancon and James F. Hudson*

Farmers' Business Cooperative Units

Rice Drying, Storage and Selling Service

In the rice section of Louisiana, farmers are operating a rough rice selling service through 13 local cooperatives. Ten of the local associations also provide drying, storage and rice handling facilities. The association at Hayes, Louisiana, in addition to the services indicated above, owns and operates a plant for milling rough rice. One additional association, the Basile Rice Drier, Inc., was organized on November 2, 1951, and the plant for drying, storing and handling rough rice is now under construction.

There are about 850 farmers who are members of local cooperative rice associations and about 400 more who are patrons but not members. In 1950 about 22 per cent of the rough rice produced in Louisiana was marketed through farmer cooperatives as compared with 11 per cent 10 years earlier. The development of cooperative driers is an important factor leading to an increase in volume of rough rice marketed by the cooperative type of business organization. Until recent years rice in Louisiana was harvested

with a grain binder and dried in the shock by the sun and wind before threshing. The use of combines began about 1935 and by 1951 approximately three-quarters of the rice grown was combined; this created the problem of drying rice by artificial methods in order to prevent quality deterioration by heating in storage. In order to avoid dumping of green rice at harvest time, rice farmers in 11 localities in Louisiana have cooperated in providing rice driers with storage and handling facilities. All of them also provide a selling service.

The efforts of rice farmers in Louisiana to increase the efficiency of rough rice markets has been successful. The local associations together with the services provided by the American Rice Growers Cooperative Association have been an important factor in narrowing the margin between the price received by the farmer and the price paid by consumers. The central office at Lake Charles furnishes daily price information on rice sales by grade and variety to each member local and thus enables member producers to know whether the top bid on a particular lot of rough rice offered for sale is in line with the price being paid in other parts of the rice-producing area. (A more detailed report regarding rice cooperatives in Louisiana can be obtained by writing to the Department of Agricultural Economics.)

—*Bueford M. Gile and Olin B. Quinn*

Cooperative Sugar Mills in Louisiana

Nine sugar mills organized under the cooperative type of business organization operated in Louisiana during the past three years. The first cooperative sugar mill was organized in 1932 and is still in operation after 20 years of continuous service. In the 1949-50 season, the nine cooperative mills processed 1,040,602 net tons of sugar cane. This amount represented 20.8 per cent of the total volume of Louisiana sugar cane processed into sugar, as compared with 1.5 per cent in 1932 when only one cooperative mill was in operation.

In the 1949-50 season, the nine cooperative mills had 607 member and 1,310 non-member patrons. Non-member patrons are principally growers who live in the vicinity of the mills and have relatively small quantities of sugar cane processed at the mills. The volume of sugar cane delivered by non-member patrons in 1949-50 was 95,830 tons, or 9.2 per cent of the total volume processed.

The cooperative function of the sugar mill evolves from the services afforded to members in the processing of their sugar cane into sugar and by-products, and in the sale of the products. In addition to the assurance that there will be a means of processing the sugar cane he produces, the member of the cooperative sugar mill benefits from any savings accrued through efficient operation

of the mill. The savings from the processing and marketing operations are returned to the member either in the form of increased ownership equity or in cash patronage dividends. Savings earned by the nine cooperative sugar mills in the 1949-50 season totaled \$956,479. The accumulated membership equity in 1950 was \$5,-527,771, or 65 per cent of the value of the total resources of the nine mills.

One of the more important aspects of the relationship between the member and the cooperative sugar mill association is the marketing agreement. This agreement is a part of the membership contract, and it specifies that: (1) the member agrees to make scheduled deliveries of all his marketable sugar cane to the mill for processing, and (2) the association agrees to process the cane and market the products to the best advantage of the membership. While the length of time covered by the marketing agreement varies among associations, the most common term is 10 years. A marketing agreement is necessary for three reasons: (1) to insure an adequate volume of sugar cane to keep the mill in continuous operation during the short grinding season, (2) to regulate deliveries among members to equalize the advantage of the increase in sucrose content in sugar cane during the season, and (3) to set forth a basis for price settlement between the association and the member.

The marketing agreement provides that the price settlement between the member and the association be made in two parts: an advance payment made to the grower at the time his cane is delivered, and a final settlement to be made at the end of the marketing season. The advance payment is based on a percentage of the full value of sugar cane, and this percentage is agreed upon by the membership prior to the beginning of the harvesting season. The association normally uses the weekly commercial price of sugar cane as a yardstick in determining the value of sugar cane for making the advance payment. The amount of the final settlement depends on the net savings of the association per ton of sugar cane processed into sugar.

—*Olin B. Quinn and Bueford M. Gile*

Dehydration of Sweet Potatoes for Feed

The dehydration of sweet potatoes on a commercial scale in Louisiana began during World War II when several canning plants contracted with the Army to supply dehydrated sweet potatoes for food purposes. The program met with considerable success and dehydrated sweet potatoes were considered by military personnel to be one of the more palatable and desirable dehydrated foods. As demobilization took place and Army food needs declined, the demand for dehydrated sweet potatoes for food purposes largely

disappeared. But the experience gained with dehydration during the war, the development and adaptation of satisfactory dehydration machinery, a growing demand for carbohydrate feeds in Louisiana, and the availability of non-marketable sweet potatoes formed a favorable setting for the development of commercial dehydration of sweet potatoes for livestock feed.

The value of dehydrated sweet potatoes for livestock feed had been proved in experimental tests. By the end of the 1946-47 season, 54 dehydrating plants were in operation in the state. Some of the plants were soon discontinued, and by the end of the 1950-51 season only 22 of the remaining 39 plants were in active operation. However, volume per plant had nearly doubled by 1950-51 and total output compared favorably with that of previous years.

Louisiana dehydrators processed 9 per cent of the total sweet potato crop in 1946, 10 per cent in 1947, 11 per cent in 1948, and slightly less than 8 per cent in 1949 and 1950. In 1950, 779,350 bushels of sweet potatoes were converted into 136,010 hundredweights of dry feed.

Volume of production is the most important single factor affecting plant operating costs because of relatively large fixed plant costs. Plants producing 6,000 or more hundredweights of feed in 1950-51 had average dehydrating costs of 89 cents per hundredweight, while plants producing less than 2,500 hundredweights reported average costs of \$2.54.

—*M. D. Woodin and Randall Stelly*

Economic Position of Livestock Industry

The livestock industry in Louisiana has made substantial progress in recent years. A favorable setting for this development has been provided by the decline of some of the major cash crops and control of their production, the eradication of the cattle tick, a decreasing farm labor supply, a growing demand for meat and livestock products, and improved production and marketing methods and facilities. In addition, farm leaders, research and educational workers, and public officials have carried on an intensive educational and development program advocating diversification of farm enterprises to balance crops and livestock so as to better use farm and labor resources, stabilize incomes, and gear farm production to the changing demands of the market.

As a result of favorable prices, greater numbers sold, and improved quality, cash receipts from livestock and livestock products increased from 18 per cent of total farm marketings in the 1924-29 period to 26 per cent in 1940-44 and to 31 per cent in 1950. Receipts from sales of cattle and calves nearly tripled in relative importance from 1924-29 to 1950.

Livestock enterprises have gained in relation to some of the

major cash crops. For instance, there were 239 acres of cotton per 100 head of cattle in the state in 1929, but by 1946 the ratio had declined to 51 acres per 100 cattle. After 1946 the ratio increased under the impetus of an expanding demand and rising price for cotton, reaching a level of 79 acres per 100 head in 1949. The cattle-sugar cane ratio has not fluctuated as widely as has the cattle-cotton relationship. There has been an increase in rice acreage, but the cattle-rice ratio has declined because numbers have increased more. —*J. W. Bennett and M. D. Woodin*

Meat Distribution in Baton Rouge

Meat for Baton Rouge consumers flows into local retail markets, restaurants, and institutions principally from a 15-state area, extending from Louisiana to Minnesota and from Texas to Tennessee. Two national packers have branch houses in the city and several national packers maintaining sales and truck routes locally, but operating out of New Orleans, supplied 64.5 per cent of the fresh meat handled by retail markets in 1949-50. Two local packers supplied 19.2 per cent, and local wholesale butchers supplied the remainder, 16.3 per cent. Packers and the four local wholesale provision firms who serve as outlets for numerous national and regional packers supplied over 90 per cent of the cured and processed meats moved into local retail establishments.

The 197 retail meat markets in Baton Rouge supplied over 80 per cent of the total meat consumed in the city in 1949-50. These markets varied in size from yearly average sales of 6,867 pounds for the Very Small markets to 336,784 pounds for the Very Large markets. Although the smaller markets comprise 52.3 per cent of the total number of markets, their sales amounted to only 11.7 per cent of the total volume. The largest markets, constituting only 17.2 per cent of the number, did 62.7 per cent of the business. Small markets often provide the retail customer with personal services that he desires, but the low volume of sales in these markets results in inefficient use of facilities and equipment. For instance, for each dollar invested in equipment, the larger markets sold nine times as much meat as did the smaller markets.

—*H. J. Casso and M. D. Woodin*

Commercial Canning and Freezing of Fruits and Vegetables

The wholesale value of the 1950 pack of the 26 commercial fruit and vegetable canning and freezing plants operating in Louisiana amounted to \$9,287,326.

Eighteen plants canned a total of 1,925,101 standard cases valued at \$5,388,709. The number of cases packed in 1950 exceed-

ed all other years of record, except 1946, and was 26 per cent above the 1949 output. The value of the 1950 production of canneries was about twice that of prewar years, 28 per cent above 1949, and only slightly less than the 1946 record. About 30 different fruits and vegetables were canned. Sweet potatoes comprised 76 per cent of the total and okra and okra-mixtures about 13 per cent.

Eight local plants and several out-of-state plants froze a total of 13 million pounds of fruits and vegetables in 1950, having a wholesale value of \$3,898,617. Major products frozen were strawberries, okra, green beans, and some of the leafy vegetables. Strawberries comprised more than 80 per cent of the total frozen pack and had a wholesale value of \$3,383,617. The frozen pack amounted to about three-fourths of the value of the canned pack.

—*H. J. Casso and M. D. Woodin*

Marketing Tung Nuts and Oil

The production of tung nuts for oil is a relatively new agricultural enterprise in southeast Louisiana, and has expanded considerably since the 1930's. The size of the crop has varied widely, changing from 25,200 tons of nuts in 1949 to 6,100 tons in 1950 and to about 2,200 tons in 1951. Usually cold spring weather has been the major cause of these wide variations. Highly variable prices for tung oil have added to the instability of the industry.

Costs of production per ton have been greatly influenced by yield, and losses to growers have been large in poor crop years. In 1950 the cost of producing, harvesting, hauling, and processing a ton of nuts on a representative group of farms averaged \$138. Costs varied from \$124 on some farms to as high as \$190 on others. The small crops have resulted in lower operating efficiency in the crushing mills as well as lower incomes to growers.

Tung production can be developed to utilize land and provide employment and a source of income in areas of the state where alternative opportunities are limited. Tung oil is an important industrial raw material and vital to a defense or war economy. The relative smallness and newness of the industry and its importance to the nation are reasons for giving producers reasonable encouragement and protection through fair import policies, reasonable transportation rate schedules, and adequate price supports.

Prices for domestically-produced tung oil cannot be fixed at levels substantially above competing drying oils without encouraging industrial users to turn to substitutes.

—*G. E. King and M. D. Woodin*

Progress of TVA-Program Demonstration Farms

Nearly 300 farms in 13 parishes participated in the Tennessee Valley Authority fertilizer demonstration project from 1937 through 1948. About 1900 tons of fertilizers were distributed to encourage the shift from row crops to soil-building grasses and legumes and to improve other farming practices.

Nearly every farmer taking part in the program made substantial financial progress during the period of participation, and many farm improvements were accomplished, such as better management practices on pasture and forage crops, erosion control, and the keeping of complete farm records. Since general economic conditions in agriculture improved greatly during the period covered by the TVA demonstration program it is difficult to measure accurately the direct effects of the program itself. However, the program made many farmers conscious of needed improvements and served as a stimulating force toward their accomplishment. The keeping of adequate farm business records and the following of better management practices will have favorable long-time results, not only on the farms cooperating in the program, but also on others in communities where the demonstration farms are located. —*H. L. Seal and M. D. Woodin*

Variations in Annual Costs and Returns For Raw Sugar Mills

The financial results of the long-time economic studies of raw sugar mills, started in 1937, indicate that in most years of the study, the net operating income and net income per unit was less than the income from the by-product blackstrap molasses. When the price of molasses declined in 1948, the average level of earnings declined and some mills were forced out of business. It appears from these studies that if molasses prices decline or income from molasses is further reduced in future years, then the raw sugar mill operators must seek other sources of income or achieve substantial cost reductions if they are to remain in business. One or more of three developments must follow in this case: unit costs must be reduced; raw sugar prices must be maintained above the 1946-50 levels; and/or increased income must be received from other by-products of the industry.

For the 1937-1949 period, the mills surveyed produced raw sugar at an average cost of \$4.71 per hundred pounds. Of this amount, 66.5 per cent was for the purchase of raw sugar cane and 33.5 per cent was for operating costs. These processors received an average gross income of \$4.83 per hundred pounds of raw sugar. The resulting net income amounted to an average of about

\$15,000 per mill per year, \$0.20 per ton of cane ground, or \$0.12 per hundred pounds of raw sugar. The net income per mill averaged 3.4 per cent annually on the average capital investment.

In most of the years studied, the mills with the larger annual tonnage had lower costs and higher net returns than those with a smaller volume of business. The principal advantage of the large-capacity mills appeared to be in reduced unit costs of manufacture and marketing. Also, the amount of sugar manufactured per ton of cane and the percentage of available sucrose recovered were greater for the large-capacity than for the mills of smaller size.

In all of the years studied, there was a general tendency for the mills with relatively high average recovery per ton of cane ground to produce raw sugar at a lower cost per pound than the mills with relatively low yields per ton processed. The most important factors causing variations in the yield per ton of cane ground were the size of the mills and the rates of extraction.

There appeared to be some differences in operating conditions and costs in the various geographic areas making up the Louisiana sugar cane area. Variations occurred as to yield of sugar per ton of cane ground and in costs and returns between the two major regions, the Mississippi Area and the Teche Region. These differences were slight, however, and showed no trend to indicate that one area was far superior to the other over a long period of time.

—*J. Norman Efferson*

Management Factors Important to Large Sugar Cane Farms

The detailed farm management and cost studies of the operation of large corporate-type sugar cane farms in Louisiana which have been conducted annually since 1937 have also indicated certain basic management principles which are important in affecting net farm returns. For the entire 13-year period 1937 to 1949, the farms studied produced sugar cane at an average cost of \$104 per acre, or \$5.76 per ton of cane sold. These producers received an average gross income for the period of \$105 per acre annually, or \$5.85 per ton. The resulting net income amounted to \$1,316 per farm annually, or \$1.45 per acre of sugar cane produced.

The financial results of this series of studies on large sugar cane farms indicate that there were variations in costs and returns due to internal management factors as well as to external causes. The major internal factors influencing net returns were found to be the size of the farm, the yield of cane per acre, efficiency in the use of man labor, and the proportion of the cropland planted to cane.

In contrast to the results from similar studies of family-type

sugar cane farms, the larger units of the corporate-type farms did not have the lowest unit costs and the highest net returns. In general, the tendency appeared to be for the moderately large corporate-type farms to make higher returns in good years and larger losses per unit in bad years than the relatively small farms of this type, and to make higher net returns in good years and lower losses in bad years than the extremely large farms of this group.

As in the case of the family-type farms, the most important single factor influencing the financial success of the farms studied was the yield of cane per acre. In all 13 years, the farms with relatively high yields produced cane at a lower cost per unit and made higher net returns per unit than those obtaining lower yields.

In general, the lower the direct labor costs per ton of cane sold, the lower were the total costs of producing cane and the higher the net returns. Labor efficiency of the farms studied appeared to be interrelated with the degree of mechanization and the size of the farm. In addition, the analysis indicated that on these large sugar cane farms, the greater the percentage of the total acreage planted to sugar cane, and the smaller the dependence on other sources of income, the lower were the costs of producing cane and the greater were the total profits from the farm business. —*J. Norman Efferson*

Farm Management Problems of Family-Type Sugar Cane Farms

The detailed farm management and cost studies of the operation of family-type sugar cane farms in Louisiana conducted annually from 1939 through 1950 have indicated certain basic farm management problems that are important to all sugar cane growers. For the 13-year period studied, the average annual labor income, or the amount of cash remaining to pay the farmer for his year's work and management after paying all farm expenses, was \$547 per farm, \$16 per acre of sugar cane, or \$0.80 per ton of sugar cane produced.

Variations in net profits from year to year were caused mostly by weather conditions affecting yields per acre, and changes in the price of sugar. Throughout the period studied, however, the financial results indicated that in any given year and under the same climatic conditions and the same price structure, there were still variations from farm to farm in costs, returns, and net profits. The major economic or management factors which were found to influence net returns were the size of the farm business, the yield of cane per acre, the relative diversity of the

business, and the relative efficiency in the use of man labor and power machinery.

Within the limits of the size of the family-type farms studied, the larger the size of the farm business, the lower were the costs of producing sugar cane and the greater were the profits from the entire farm business. A size of farm of about 100 acres in crops of which 50 acres are in sugar cane is indicated to be needed to maintain the most efficient family-type sugar cane farm.

The most important single factor influencing the financial success of the farms studied was the yield per acre of sugar cane. In all years studied, the producers obtaining relatively high yields had lower costs per unit and higher net returns. The facts indicate that in a normal season the farmer who does not average a 20-ton yield on his entire acreage is also the one who does not make a profit on the enterprise.

The larger of the family-type farms, averaging from 50 to 150 acres in sugar cane, were efficient enough in the production of cane that the more they specialized in sugar cane alone, the more they earned for their year's work. The smaller family-type farms, with 2 to 15 acres in cane, made greater total returns for the year when they diversified their farm businesses by the addition of other cash crop enterprises and were not completely dependent on the sugar cane crop for all cash income.

Labor efficiency was also important in maximizing farm returns. The producers who maintained peak use of available labor by an adequate size of unit, the use of well-established machinery, and by planning their work in advance obtained a labor efficiency rate of 300 days of productive work annually and made higher returns than those with lower levels of labor use.

—*J. Norman Efferson*

Cash Income from Farming

The cash income of Louisiana farmers from marketings of agricultural commodities in 1950 was 289 per cent of the prewar average (1935-39 = 100). If this cash income is deflated to purchasing power of farmers' money in the same base period it shows that Louisiana farmers' production effort provided them with 42 per cent more purchasing power in 1950 than the average in 1935-39. Of the more than fifty agricultural products included in the composite index of farm income from cash marketings, only five provided less cash income for farmers in 1950 than the average in 1935-39. Cash returns from sheep and lambs in 1950 were 79 per cent of the base average. Other products providing smaller cash income from farm marketings were: butterfat, 13 per cent; Irish potatoes, 90 per cent; beets, 37 per cent; and spinach 79 per cent of the 1935-39 average income.

Indexes of Cash Income From Marketings of Agricultural Products, Louisiana, 1925-1950
(1935-39 = 100)

Year	Composite index	Crops	Livestock & products	Meat animals	Cattle & calves	Hogs	Dairy products	Poultry & eggs	Cotton	Rice	Sugar cane for sugar	Sweet potatoes
Average 1935-39												
1925	100	100	100	100	100	100	100	100	100	100	100	100
1926	152	164	102	83	66	112	101	190	225	137	70	138
1927	112	113	111	88	63	133	113	212	134	118	28	94
1928	114	113	116	96	95	97	117	210	140	122	29	118
1929	127	130	115	88	102	62	118	233	160	119	47	82
1930	135	139	120	93	101	77	129	223	172	126	72	104
1931	91	87	108	79	81	73	118	216	88	99	57	82
1932	68	66	77	54	61	39	98	131	63	55	48	66
1933	56	55	61	49	48	49	75	79	52	47	58	60
1934	64	65	59	48	42	56	77	66	61	84	56	71
1935	76	78	68	60	54	71	86	53	83	91	46	99
1936	85	84	88	90	97	77	88	81	84	81	85	94
1937	118	125	90	87	88	86	95	89	130	127	118	123
1938	110	111	103	101	101	102	102	113	122	96	100	97
1939	91	87	108	112	108	121	107	95	77	90	102	97
1940	96	93	110	109	106	114	107	123	88	106	96	89
1941	78	89	116	112	124	92	114	138	58	105	51	70
1942	108	100	144	142	152	125	129	191	74	179	102	120
1943	170	164	193	184	165	220	173	288	149	253	135	175
1944	215	206	249	214	194	259	214	502	196	261	162	406
1945	207	191	276	254	219	322	226	508	173	253	160	368
1946	212	187	312	316	313	329	221	531	116	381	191	474
1947	231	200	361	406	437	358	255	437	105	351	192	423
1948	283	237	472	568	605	516	315	458	219	378	186	300
1949	319	282	470	552	577	516	329	474	312	364	203	316
1950	277	240	427	472	484	467	314	527	240	307	238	349
	289	241	462	527	542	518	354	458	216	363	259	252

Crops provided Louisiana farmers with 142 per cent more cash income in 1950 than the average in the base period, while livestock and livestock products returns were 362 per cent higher. Increases in cash returns were greater from sales of cattle and calves than for any other individual item in the composite index, with an increase of 442 per cent. The increase in cash income from poultry and eggs was 358 per cent. Cash income from hogs in 1950 was 418 per cent more than in 1935-39. Dairy products' gain in cash income amounted to 254 per cent. Cash income from cotton was 116 per cent greater in 1950 than in 1935-39. Rice returned 263 per cent more. Returns from sugar cane for sugar were 159 per cent higher, and the cash income from sweet potatoes was 152 per cent more in 1950 than the average in the base period.

—*J. P. Montgomery*

Financing Farming Adjustments in the Upland Area of North Louisiana

The Louisiana Agricultural Experiment Station, in cooperation with the Farm Credit Administration, the Bureau of Agricultural Economics, and the Agricultural Experiment Stations of Alabama and Mississippi, recently completed a study, the general objective of which was to determine capital requirements as the basis for evaluating the role of credit and other methods of financing desirable farming adjustments in the South.

The case study method was the basis of approach to the problem, and the Coastal Plains Upland Cotton Area of North Louisiana was selected for the study. One was typical in size for the area, with physical resources and the financial position of the farmer representative of the area, and need for farm enlargement probable; another was large enough for feasible adjustments without farm enlargement; the third was well advanced toward a new farming system.

Four alternative systems of farming were budgeted for the farm which was large enough for feasible adjustments without farm enlargement. These included: (1) the present system; (2) a system based on planting the entire acreage of cropland to corn and soybeans for hogging-off purposes; (3) a system based on beef cattle, using the "cow and calf" plan of production and marketing; and (4) a system based on dairy cattle.

Of the four systems of farming which were budgeted, the system based on dairying showed the greatest promise of financial success. This system, therefore, was chosen for projecting estimated costs, returns, and net returns at present price-cost relationships into the future for a period of time sufficiently long for the farm operator to recover his investment in the cattle, new

buildings, and new equipment necessary to go into the dairy business. Consideration also was given to general farm expenses and to living costs for the farm family.

Assuming that the program was begun in 1951, the estimated investment by years in cattle, buildings, and new equipment is as follows:

<i>Year</i>	<i>Amount</i>
1951	\$ 4,850
1952	6,150
1953	780
Total	\$11,780

The estimated deficit or surplus of income over cash expenses, by years 1951-1956, is as follows:

<i>Year</i>	<i>Deficit</i>	<i>Surplus</i>
1951	\$3,097	\$ —
1952	3,305	—
1953	—	1,333
1954	—	2,565
1955	—	4,331
1956	—	5,848

The operator owed \$2,800 as of August 15, 1951. Assuming that he followed the above program, paid interest on outstanding indebtedness at the rate of 5 per cent per annum, and paid the total surplus above cash costs to the end of each year after 1952, his indebtedness by years would be as follows:

<i>Year</i>	<i>Indebtedness</i>
1951	\$6,114
1952	9,890
1953	9,051
1954	6,939
1955	2,955

1956

Surplus \$2,745

—Felix E. Stanley

Organizational Problems on Small Farms in the North Louisiana Upland Cotton Area

A study of organizational problems on small farms in the North Louisiana Upland Cotton Area for the 1950 crop year has been completed. The general objective of the study was to compare financial results for groups of farms having the major types of enterprise combinations found in the area to determine the rela-

tive profitableness of each. To the extent that was practical, the farms included in the study were selected so that they were directly comparable with respect to size of farm business, production rates, labor efficiency, and the level of managerial ability of the operators. Having selected the farms in this manner, it was assumed that major differences found in financial results for the different enterprise combination groups would largely reflect the relative profitableness of the farm enterprises included in each combination.

Financial results, as measured by average labor earnings to the operators in each major enterprise combination group, are presented in Table 1.

TABLE 1. Average Labor Earnings for Farms Grouped by Type of Enterprise Combination in the North Louisiana Upland Cotton Area in 1950

Type of enterprise combination	Number of farms	Average labor earnings
Livestock - poultry - truck	10	\$ 1,566
Dairy	10	1,548
General	13	1,469
Cotton - truck	18	1,146
Livestock - poultry - cotton	21	763
All farms	72	\$ 1,206

—*John D. McNeil and Felix E. Stanley*

Beef Cattle in the Delta Area of Northeast Louisiana

A study of production practices and costs and returns to the beef cattle enterprise in 1950 for the Delta Cotton Area of Northeast Louisiana has been completed. The beef cattle enterprise in the area was built around permanent improved pasture, although some woodland, idle cropland, and other lands were used by beef cattle on most farms. There was an average of 2.9 acres of permanent improved pasture per brood cow on the farms surveyed.

There were approximately two deaths per 100 animals in the herds. Most farmers were found to be highly conscious of the importance of preventing death and disease. Of the farmers surveyed, 96 per cent vaccinated cattle against at least one disease, 98 per cent sprayed cattle at least once, and 47 per cent wormed their cattle. Considerable variation was found in feeding practices. The most common practice was to keep hay available most of the winter and to use additional feed only during extremely bad weather. Less than one-half of the farmers reported feeding protein supplement or grain constantly through the winter. A mineral supplement was fed on 78 per cent of the farms.

With the exception of cattle purchases, feed costs constituted by far the largest item of expense to the enterprise (Table 1). This indicates the possibility of reducing costs to the enterprise by using feeds that can be produced cheaply and by making maximum use of by-products and other materials that would otherwise be wasted. Maintenance of permanent pasture and fences was another important item of cost. The major operation connected with pasture maintenance was clipping, and the principal costs were for labor and machinery.

TABLE 1. Summary of Costs and Returns to the Beef Cattle Enterprise in the Mississippi River Delta Cotton Area of Louisiana in 1950

Item	Average costs and returns per farm
Operating costs:	
Cattle purchases	\$ 4,124
Home-grown feed	3,423
Purchased feed	1,043
Pasture and fence maintenance	1,378
Hired labor	759
Selling Cost	259
Veterinary, vaccines, medicines and sprays	176
Other costs ¹	1,453
Total operating costs	\$12,615
Total returns	\$20,725
Net operating returns	8,110
Net operating returns per cow	61
Net operating returns per acre of permanent pasture	21

¹Includes water system operation, building maintenance, tractor, truck, auto and horse use, a charge for crops and supplementary pasture grazed, and other miscellaneous expenses.

Returns to the enterprise included sales, increases in herd inventory values, and miscellaneous income. Increases in inventory values were particularly significant in 1950 because of rapidly increasing herd sizes. Miscellaneous income consisted principally of sales of hay and seed harvested from permanent pasture.

Net operating returns, or the return to the farmer for his land, labor, investment, and management, amounted to approximately \$61 per brood cow in the herd, or \$21 per acre of permanent pasture. The herd size on the farms surveyed varied from 15 to 700 brood cows, with an average of 133. Net operating returns per acre increased as herd size increased. —*Bill Bolton*

Marketing Hatching Eggs in Louisiana

There were 75,000 layers producing hatching eggs during 1949-50, when 200,000 would have been needed to support adequately the operating hatcheries in Louisiana. Seventy-five per cent of the flocks had fewer than 100 hens, and less than 10 per

cent of 170 flock owners interviewed received the major source of their income from the hatching egg enterprise. Only 36 per cent of the farmers entering hatching egg production since 1944 were still in business in 1950. An unfavorable egg-feed price ratio and a short market season for hatching eggs were given by most of the producers as the main causes for discontinuing the production of hatching eggs, although the prices received for Louisiana eggs were higher than the prices paid for out-of-state eggs at the same markets.

The data obtained from a study of producer-hatchery trading relations indicate that farmers in Louisiana would increase the production of hatching eggs if marketing conditions were improved to provide a more nearly year-round demand for hatching eggs and a better outlet for the "market" eggs, or the eggs not qualified for hatching. The seasonal difficulty may be alleviated somewhat by the rapid growth of the broiler industry in the state, which will provide an all-year demand for chicks and consequently a longer marketing season for hatching eggs.

—*Ewell P. Roy and James M. Baker*

Future Farmers of America Hatchery Service

The 27 Future Farmers of America organizations in high schools in Louisiana have included hatchery service in their list of laboratory activities for the purpose of teaching students in certain phases of poultry production and marketing and to encourage better poultry farming in the community. Eighty-six per cent of these hatcheries operating during 1949-50 had fewer than five egg suppliers, and 71 per cent depended entirely on local producers for eggs. Twenty-one per cent of the hatcheries reported either a "passed" or "controlled" pullorum rating. Over three-fourths did not report any observance of methods to prevent this disease. Most FFA units maintained relatively high standards for grading eggs, vaccinating chicks for Newcastle disease and replacing chick losses in the flock. To improve breed and quality about one-eighth of the hatching eggs were obtained in other states. Seventy-one per cent of the hatcheries sold chicks to students. Custom hatching also was done to help the poultry enterprise in the community and to reduce the cost of operation. The hatchery under the supervision of the agricultural instructor renders a needed service to students of vocational agriculture and to farmers of the communities not having access to commercial hatcheries. —*Ewell P. Roy and James M. Baker*

Agricultural Engineering

Drainage and Cultivation of Sugar Cane Land

Research on drainage of sugar cane land is conducted jointly by the U. S. Department of Agriculture Soil Conservation Service Research and the Louisiana Agricultural Experiment Station.

During the past season areas were precision graded, cutting the high spots and filling the low spots, and advantage was taken of the natural slope of the field. A plot of approximately 34 acres was surrounded by abandoned levees and spoil banks, with a swampy section across the lower half. The area was graded by using scrapers to move the earth from the spoil bank and levees to fill the depressions, smoothed with a land leveler, ditched and deep tilled with a Graham-Hoeme plow. Prior to grading, only 15 per cent of this area had been farmed, giving yields of 16 to 18 tons of plant cane per acre. The entire area, 33.84 acres, averaged 24.2 tons per acre, with the cost of grading being approximately \$100 per acre. From one year's results it would seem practicable to grade these problem areas.

A second area of 46.11 acres of typical cane land was graded, ditched and deep tilled at a cost of approximately \$45 per acre (contract price). The soil of the area varied from sandy mixed land to heavy black land. The lighter land was planted to CP 36-105 cane and the heavy land planted to CP 34-120. The average yield for the 46.11 acres of graded area was 25.62 tons per acre and for the check 18.18 tons, an increase of 7.44 tons.

The Station worked on the cultivation phase of this experiment as follows: A four-row cotton cultivator was converted to a three-row sugar cane cultivator to test the feasibility of flat cultivation of sugar cane. A plot of approximately 34 acres of sugar cane stubble was graded to give a side fall ranging from .2 to .3 foot per 100 feet of width of cut in the summer of 1950. The land was then deep tilled, one cut was planted flat and the rest of the area planted in the customary plantation system. An additional area was graded for crown and planted in the customary plantation rows.

The flat plots received three cultivations requiring .38 hour per acre for the season; the normal plantation plots received six cultivations, or two hours per acre for the season's cultivation. All plots received two herbicidal sprayings to the row, of 2/3 pound of 2,4-D per acre and one blanket herbicidal spraying of 1 pound of 2,4-D per acre. The flat plots required one hour of hoe labor per acre to rogue out scattered Johnson grass plants and the nor-

mal plantation plots required $11\frac{1}{2}$ hours of hoe labor per acre. Quarter drains were plowed in each cut at the start of the season at a cost of 36 cents per acre, with no further maintenance on the flat plots, as compared to seven plowings and shovelings for the plantation check plots at a cost of \$2.52 per acre.

The yield data were actual tons of sugar cane that had been frozen and topped low to remove deteriorated cane. No attempt was made to adjust yields to sugar per acre.

The planting tests are of only one year's work; flat cultivation is not recommended until tests have been of longer duration.

—*Harold T. Barr and I. L. Saveson*

Sweet Potato Machinery and Equipment

Chemical Weed Control

Tests were conducted for a second year on the use of chemicals and oils to replace the hand operation of hoeing weeds and grass in sweet potatoes. Chemicals were used in both pre-planting and post-planting treatments. Oils were used only as a post-planting treatment. A study was also made to determine what effect the use of a transplanter would have on the pre-planting sprays applied in an 18-inch band on top of the prepared seedbed. The transplanter used was of the standard type having a furrow opener which would disturb the top of the row in setting the plants. Table 1 shows the types of chemicals used as a pre-planting spray and the rates of application. It can be noted from this table that the effectiveness of the chemicals in retarding weed and grass growth was reduced in every case when a transplanter was used.

The post-planting sprays were applied in a band 8 inches on each side of the plants about 10 days after the plants were set. The per cent control of weeds and grass when chemicals were used as a post-planting spray was not as good as when the same chemi-

TABLE 1 Per Cent Control of Weeds and Grass in Sweet Potatoes from the Application of Different Chemicals as a Pre-planting Spray (1951)

Treatment		Weed control*	Bu./A.**
Dinitro 4 lbs./A (Premerge)	hand planted	97.7%	181.6
	machine planted	52.8%	192.6
Dinitro 8 lbs./A (Premerge)	hand planted	82.1%	142.1
	machine planted	60.7%	211.1
CMU ($\frac{1}{2}$ lb./A)	hand planted	47.7%	146.1
	machine planted	24 %	150.9
CMU (1 lb./A)	hand planted	51.5%	67.6
	machine planted	14.4%	139.5
Check	hand planted	0 %	168.8
	machine planted	0 %	138.9

* Per cent control is figured by average check minus average treatment divided by average check.

** All plots hand hoed after weed and grass counts made.

cals were used as a pre-planting spray. Oil applied as a post-planting spray gave poor results, even with applications as high as 45 gallons per acre blanket basis.

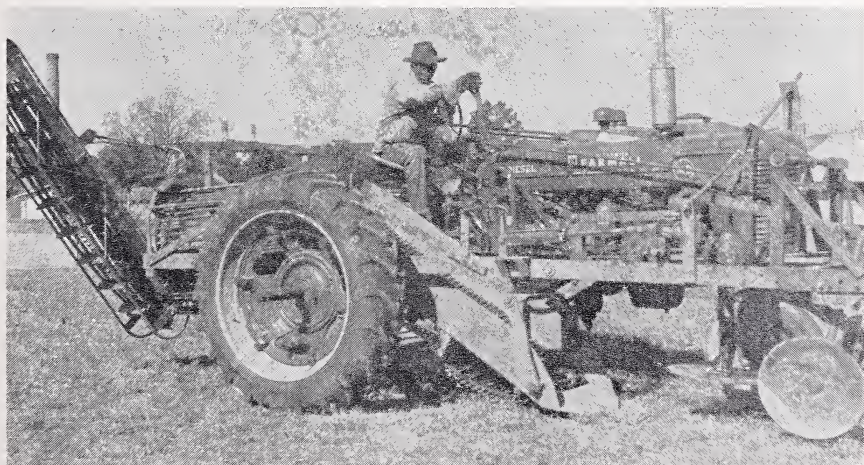
Sweet Potato Storage House

Concrete slag blocks are becoming very popular as a building material for farm sweet potato storage houses. A concrete block sweet potato storage house (20 ft. x 48 ft.) having a concrete floor was built at Chase, Louisiana, and records kept this past season on cost of heating. The house has no ceiling and is open to the rafters, with no insulation being used in the walls. The capacity of the house is 2,000 bushels. Four 1000-watt strip electric heaters which are thermostatically controlled furnish heat for the storage house. The thermostat was set to cut on at 55° F. and off at 65° F. Storage time was 4-3/4 months and cost of electricity for heating for this period was 2.2 cents per bushel. Cost of electricity in this area is 2.01 cents per kwh. On a storage space basis cost it was \$4.69 per 1000 cubic feet of storage space. Insulation in the blocks and ceiling would further reduce the cost of heating.

—Wiley D. Poole and Teme Hernandez*

Mechanization Studies of Industrial Sweet Potatoes

A machine for harvesting the industrial type of sweet potatoes was tested for a second season. This machine is mounted on a large tricycle type two-row tractor, and is capable of digging,



A new type of harvesting machine for the industrial sweet potato. This machine is still in the developmental stage.

* A staff member of the Department of Horticulture, Experiment Station, collaborating with the Department of Agricultural Engineering.

cleaning, and loading sweet potatoes in one operation. During this past harvesting season, it was found that the shaver mounted on the front of the harvester for removing vines was not entirely satisfactory in heavy vine growth. The barrel type slotted tumbler did an excellent job of separating the potatoes from the soil. The side-loading elevator on this year's model was found to be too light and will have to be made heavier for next season's testing.

This harvester will be tested again next fall after incorporating all changes found advisable from this past season's operation.

—*Wiley D. Poole*

Anhydrous Ammonia Fertilizer Equipment

Extensive laboratory tests and field checks were conducted during the past year with different makes and systems for applying anhydrous ammonia. Tables for applying anhydrous ammonia in terms of nitrogen per acre were developed from the test data for rates of 40 to 100 pounds of nitrogen per acre by 10-pound increments. All implement row spacings between 36 and 144 inches and prevailing tractor field speeds were used in making the test and charts. Delivery gauge pressures above 70 pounds were found to give inaccurate results with both needle and automatic type metering valves. A bulletin on anhydrous ammonia fertilizer application, equipment, and storage is now in the press. Some 5,000 farmers in Louisiana in 1951 used a little over 16,000 tons of anhydrous ammonia in fertilizing 500,000 acres.

—*Harold T. Barr*

Liquefied Petroleum Gas as a Tractor Fuel

A large number of farm tractors in Louisiana have been converted to burn liquefied petroleum gas during the past three years. The present price differential makes this fuel attractive to farmers. By buying in large quantities the farmer can obtain the fuel at a lower price and can use it handily for such other purposes as heating his house, cooking, heating water, and drying grain and forage crops.

Laboratory tests on a typical tractor engine operated under load indicate that the use of L. P. gas should result in a longer engine life with fewer overhauls. For most efficient utilization of L. P. gas the following recommendations are made: install an approved carburetor designed for L. P. gas, put in cold spark plugs designed for high compression, and advance the ignition timing for best operation. (The amount of advance will vary with compression ratio and engine design but will generally be from 3 to 10 degrees over tractor fuel or gasoline.)

—*J. C. Newell, J. A. Rebentisch, W. H. Carter, Harold T. Barr*

Cotton Mechanization

The need for careful cultivation practices is emphasized in recommendations for the use of chemicals to control weeds in the drill area of cotton rows. Of particular importance is that area nearest the sprayed or treated band; tools and methods ordinarily used for cultivating have not proved satisfactory here.

In 1951, extensive studies were made to determine the most desirable implement for use on the critical shoulder area of the row. Eight tools, both commercial and shop constructed, were selected for detailed study after preliminary trials of many implements. Soil-engaging tools for such cultivating should meet at least three general requirements. They should (1) leave a uniform bed without a ridge adjacent to the chemically treated band, (2) effectively control the weeds and grasses in the area being cultivated, and (3) leave in place that soil on the shoulder instead of throwing it on the drill area of the row. Evaluation of all implements was on the basis of the requirements specified above.

Cultivating sweeps as they are known today do not appear satisfactory for the type of cultivation required for a chemical weed control program. However, a shielded sweep arrangement maintained the cultivating and penetrating advantages of the regular low crown sweep and yet prevented soil from being thrown to the treated drill area. At the same time a smooth shoulder was obtained and a nozzle bracket on the shield allowed application of post-emergence sprays with the same tool.

—*Lawrence E. Creasy and Joseph L. Smilie*

Harvesting and Curing of Hay

The use of a barn drier to cure hay has proved to be an economical and profitable operation. Early, high quality hay has been cured during a period when it was impossible to completely cure hay in the field. Using the barn drier allows the farmer to take hay from his pastures early in the season when the hay grows the fastest. At this period most farmers are unable to keep these early clovers grazed down. Hauling the hay to the barn drier as long-hay is still the most popular cut, as it allows the farmer to change over to the use of a barn drier without investing in much additional machinery. The use of a long-hay field loader greatly reduced labor for getting hay on the wagon or truck, and the hay hoist and fork is almost a necessity for economically loading and unloading at the barn drier.

In one test, white Dutch clover seed was gathered by cutting the clover as hay and curing it in the barn drier. After the hay was dried, seed was threshed by passing the hay, as it was unloaded off the drier, through the thresher at the barn.



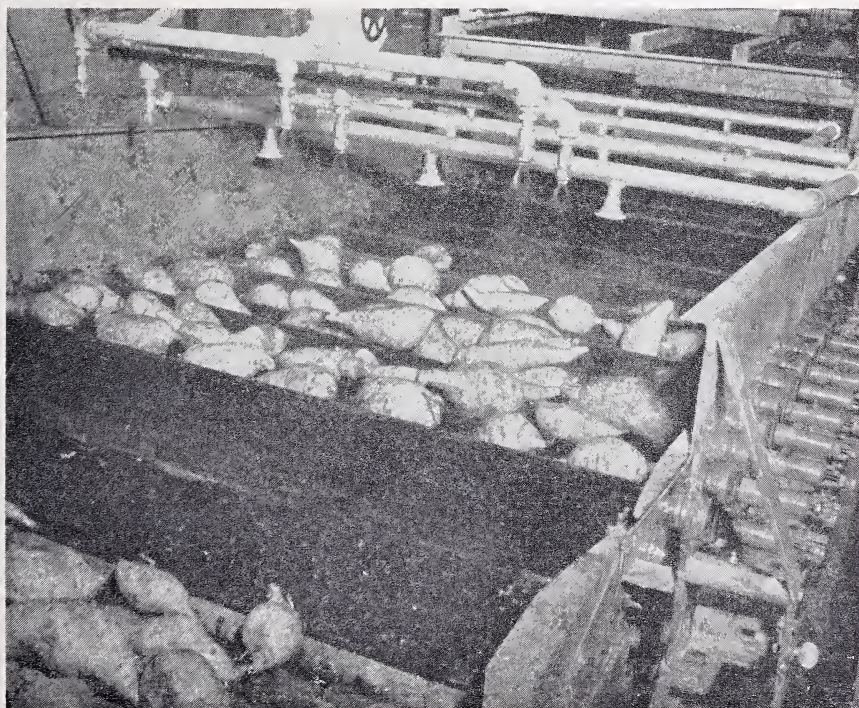
Top picture—Proper cultivation when chemicals are used for weed control in cotton. Note undisturbed and clod-free drill area. Bottom picture—Shielded sweep arrangement developed by Agricultural Engineering Research Department.

Most of the existing barns can be very easily converted into barns for artificially curing hay by simply building a portable false floor for channeling the air up through the hay. Some means for heating the air before it is forced into the hay is definitely recommended. Natural gas, butane and oil have been found satisfactory for this purpose. —*Wiley D. Poole and Harold T. Barr*

Spraying Borax Solutions on Washed Sweet Potatoes for Controlling Black Rot

Dipping of washed, uncured sweet potatoes in a one per cent solution of borax has been practiced by some sweet potato packers in recent years. However, the dip tank arrangement has not been too satisfactory, because of splashing which occurs when potatoes roll over into the tank and the damage due to bruising resulting from this action. A system was devised whereby a spray of a one per cent solution was directed on the washed potatoes as they rolled on the brushes toward the grading and packing belts.

The spraying was done by two banks of three 80° fan-shaped spray nozzles suspended 15 inches above the brush rollers. The



Spraying borax solution on sweet potatoes as they emerge from the washing machine.

nozzles were staggered in line to give the best coverage. The solution was mixed and held in two 55-gallon tanks and connected to the spray nozzle banks by a $\frac{3}{4}$ -inch pipe. The 40-pound pressure necessary at the nozzle was furnished by a $\frac{1}{3}$ h.p. electric-centrifugal pump. Approximately 150 gallons of solution were used per car lot (450 crates). Cost of the borax for the above was about one dollar. The cost when using the dipping process is somewhat less. The protection against black rot in sprayed potatoes was approximately the same as in dipped potatoes.

—*Wiley D. Poole and W. J. Martin**

Dielectric Treatment of Rough Rice

This project is a joint undertaking of the Louisiana Experiment Station and the U. S. Department of Agriculture, Agricultural Engineering Research. A study of the effects of the radio-frequency electric field upon rough rice is being conducted to determine the worth of applied dielectric heating in the rice drying and storage processes.

The major portion of the work to date has been devoted to the drying phase but both electrical characteristic and hygroscopic equilibrium studies are being conducted concurrently with the drying tests. The tests being conducted on the drying phase are based upon vapor pressure differences existing between the rice and the air surrounding the rice at any particular set of drying conditions.

The indications are that the drying rate for a particular initial moisture content rice is a function of vapor pressure difference *only*, and that temperature has no effect upon this rate (within the range 100° to 140° F.) other than as a factor for control of vapor pressure of the rice. We believe this result indicates erroneous thinking and drying techniques by drying operators in many quarters, since most operators use temperature as the basis for the drying operation and give little if any thought to other existing conditions. —*Finis T. Wratten*

Research in Building Materials from Farm Residues

During the past year attention was directed to the use of rice hulls and rice hull ashes as aggregates in the production of a lightweight structural concrete. A number of mixes were formulated with the use of Portland cement as a binder. It was noted that an addition of one part of hydrated lime to one part of Portland

* A staff member of the Department of Plant Pathology, Experiment Station, collaborating with the Department of Agricultural Engineering Research.

cement by volume increased the compressive strength of the rice hull concrete as much as 100 per cent in some cases. Tests have indicated that rice hull concrete possesses some characteristics similar to those of wood, such as resiliency, susceptibility to driving nails or staples, thermal insulating quality, and others. It has been found that rice hull concrete can be produced that will withstand a compressive load of 10,00 pounds per square inch at a material cost of 57 cents per cubic foot of concrete with a density of 68 pounds per cubic foot. This is still a little below the strength requirements of the ASTM standards; however, there is a definite indication that a rice hull concrete product that will meet the standards can be produced at a material cost of 50 cents per cubic foot, or less.

Investigations are being made to determine a satisfactory form for moulding blocks that will conform to the characteristics of the rice hull concrete.

Rice hull concrete has been made up in pre-cast slabs, using lightweight steel channel on all four sides. A house has been built by a private party using this type of construction with stucco on the outside and plaster on the inside. This house will be kept under observation to determine the feasibility of this type of construction. —*Carl H. Thomas*

Animal Industry

Swine Breeding

The swine breeding program is based on Production Registry testing and selection of meat type breeding stock. A closely line-bred boar was introduced into the herd in 1949 for the specific purpose of improving the meat qualities of market hogs.

Carcass studies on progenies from this inbred line have indicated a higher percentage of lean meat than produced in previous lines under observation. The high standards of type, prolificacy, and rapid gaining qualities have not been reduced. The production record of the 1951 fall farrowed litters is as follows:

No. of Litters Farrowed	Av. No. of Pigs per Litter	Av. No. Weaned per Litter	Av. Weaning Wt. per Pig
12	10	8.75	37.8 lbs.

Eighty-three per cent of the litters farrowed qualified as Production Registry litters. Seventy-five per cent of these high quality pigs are distributed at a nominal price to farm boys and girls for the purpose of herd improvement.

Future plans for this project include a program for the development of inbred lines. This program will be designed to yield information on the value of inbreeding as a method of (a) improving the performance of an existing breed and (b) improving the performance of a breed when used in a crossbreeding program. The present outstanding herd of Duroc swine will be maintained and bred under the same rigid system of testing and selection as in the past.

—C. B. Singletary, R. A. Damon, Jr.,
R. M. Crown, T. M. DeRouen, and J. B. Francioni, Jr.

Ammoniated Condensed Distillers Molasses Solubles as a Feed for Beef Cattle

Industrial by-products have long been used as feeds for livestock. Recently a new by-product has been developed by condensing the residue from yeast fermentation of cane molasses to commercial alcohol. If this material is condensed to around 60 per cent solids, the following analysis is obtained: crude protein — 4 to 5 per cent, nitrogen free extract — 28 to 30 per cent, water — 39 to 40 per cent, and ash — 15 to 17 per cent.

At present the distillers molasses solubles are treated as a waste product and pumped into the Mississippi River. As the analysis indicates the material to have a potential feed value and as Louisiana has a very economical source of anhydrous ammonia for ammoniating it, this product is being tested as a protein and energy extender when used in the ration of growing beef cattle.

Two 56-day feeding trials were conducted. In each trial 15 calves were distributed on the basis of sex, weight, and breeding into 3 lots of 5 animals each. The animals were hand-fed the concentrate ration once daily. Grass hay, water, and minerals were given ad libitum. Alfalfa hay was given once a week.

The composition of the rations is shown in Table I.

TABLE I. Rations used in Experiments 1 and 2

Item	Lot 1	Lot 2	Lot 3
Corn	46.00	40.00	44.00
Cottonseed meal	23.00	20.00	16.00
Molasses	31.00	—	—
*CDMS Mixture 1	—	40.00	—
**CDMS Mixture 2	—	—	40.00

* 75% molasses - 25% ammoniated condensed distillers molasses solubles.

** 50% molasses - 50% ammoniated condensed distillers molasses solubles.

The two trials showed no significant differences in gain when ammoniated condensed distillers molasses solubles replaced 25 per cent and 50 per cent of the molasses in a normal ration for growing beef cattle. However, in both trials the lots receiving the ration with 50 per cent ammoniated condensed distillers molasses solubles made the lowest gains.

The animals receiving the ammoniated condensed distillers molasses solubles made more efficient use of their feed during the last periods than during the first periods of the tests. This indicates that time is required to change the rumen microflora for utilization of rations containing the ammoniated molasses product. —A. D. Tillman, J. F. Kidwell, and C. B. Singletary

Methods of Feeding Cane Molasses to Beef Cattle

In the Gulf Coastal area there is a fairly constant supply of blackstrap or cane molasses. When molasses is not being used in the manufacture of industrial alcohol the price is so low that it is the cheapest available source of carbohydrate feedstuff for livestock. Two separate feeding trials were conducted to compare various methods of feeding blackstrap molasses to fattening beef calves. The first trial was designed to compare four methods of

feeding molasses. The second trial was designed to duplicate two rations of the first trial and to test the value of adding urea (two-sixty-two) to rations containing molasses.

The composition of rations fed in the two trials is shown in Tables I and II.

TABLE I. Composition of rations—Experiment I

Ration	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
Corn	79	46	46	46	30.4
Cottonseed meal	21	23	23	23	30.4
Cane molasses	—	—	—	31	39.2
Molasses-bagasse	—	31	—	—	—
Molasses-CS hulls	—	—	31	—	—
Grass hay	free choice	free choice	free choice	free choice	free choice
Mineral mixture	free choice	free choice	free choice	free choice	free choice

Alfalfa hay fed once a week to all lots.

TABLE II. Composition of rations—Experiment II

Ration	Lot 1	Lot 2	Lot 3	Lot 4
Corn	79	46	55	60
Cottonseed meal	21	23	5	—
Molasses	—	31	—	—
Urea in molasses	—	—	40*	40**
Prairie hay	free choice	free choice	free choice	free choice
Mineral mixture	free choice	free choice	free choice	free choice

*Urea dissolved in molasses - 8 pounds urea and 92 pounds molasses.

** Urea dissolved in molasses - 10 pounds urea and 90 pounds molasses.

Alfalfa hay fed once a week to all lots.

In the first trial the molasses-bagasse and the molasses-cottonseed hulls mixtures were dehydrated feeds. These were mixed with the other dry ingredients to form Rations 2 and 3. In Rations 4 and 5 the molasses used was in the liquid state. The animals receiving the molasses in the liquid state made very satisfactory gains. The gains of those receiving the dehydrated molasses in Rations 2 and 3 were not satisfactory. These animals made smaller gains and carried less finish than the animals receiving Rations 1, 4 and 5. It is interesting to note that of the two rations containing liquid molasses, the group receiving the higher amount (Lot 5) carried somewhat less finish.

The control (Ration 1) and one molasses ration (Ration 4) of the first trial were also included in the second trial. Similar results were obtained in both experiments, indicating the same value of these rations. The study was extended by adding urea to the rations of two lots. Urea was dissolved in the molasses of both rations. In one ration urea supplied 43.2 per cent of the protein in the total ration and in the other, 53.2 per cent of the protein.

Similar gains were made by the lots receiving either level of urea. These gains were lower than those made by lots receiving the control ration. More feed was required to produce a unit of gain by the animals receiving urea. The urea did not alter the palatability of the molasses. No harmful physiological effects of urea were apparent in any of the animals receiving it in their ration.

—*A. D. Tillman, C. B. Singletary, J. F. Kidwell, and C. I. Bray*

Solvent Extracted Rice Bran in the Rations of Growing-Fattening Swine

Rice bran is the principal by-product of the rice milling industry. Previous work with the product showed that when rice bran did not exceed 30 per cent of the total ration, it was approximately equal to corn in feeding value. The utility of this product was limited by the high degree of unsaturation of the fatty acids. The feed quickly became rancid during storage and produced soft pork when fed to fattening swine.

Commercial extraction of fat from rice bran was begun in 1949 and a new product designated "solvent extracted rice bran" became available. This product differs from raw rice bran in being lower in fat, higher in protein, fiber, and N.F.E. This study was designed to evaluate solvent-extracted rice bran. A feeding trial involving 40 pigs divided into eight equal lots is reported. The composition of the rations is shown in Table I.

TABLE I. Composition of rations

Ration	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8
Ground yellow corn	75.0	74.5	63.0	62.5	60.0	51.0	50.5	47.5
Rice bran	—	—	15.0	15.0	15.0	30.0	30.0	30.0
Fish Meal	5.0	5.0	5.0	5.0	—	5.0	5.0	—
Soybean meal	15.0	15.0	12.0	12.0	19.5	9.0	9.0	17.0
Dehydrated alfalfa leaf meal	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
APF supplement	—	0.5	—	0.5	0.5	—	0.5	0.5
Mineral mixture	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib
Salt	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib	Ad lib
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Results obtained are as follows:

1. The lots receiving 15 per cent rice bran utilized their feed as efficiently as did the lots receiving the control rations of corn as the main cereal grain and fish meal.

2. When rice bran was fed at the 30 per cent level, more feed was required to produce a unit of gain.
3. The solvent-extracted rice bran did not affect the firmness of fat.
4. The APF supplement significantly improved the rations containing fish meal.
5. The rations having an all-vegetable protein supplement (soybean oil meal) plus the APF supplement of vitamin B₁₂ and aureomycin were equal to those containing fish meal without the APF. —*C. B. Singletary, A. D. Tillman, and J. F. Kidwell*

Improvement of Beef Cattle for the Southern Area

This project is being conducted as a part of a cooperative breeding program in conjunction with eleven other Southern States and the Bureau of Animal Industry. The project at Baton Rouge was initiated with the intention of utilizing the commercial beef herd already in existence here. However, because of the complexity of the genetic make-up of the animals, no definite results could be obtained. It has been decided to dispose of many of the animals now in the herd and assemble cattle of known genetic origin in order to ensure more constructive and informative results.

The project has been rewritten and designed to extend over a nine-year period. The experiment has been divided into three phases of three years each. The first phase will consist of crossing cows of Hereford, Angus, Brahman, and Brahman-Angus breeding to bulls of Hereford, Angus, Brahman, Brahman-Angus, Shorthorn, and Charbray breeding. The performance of the crossbred calves resulting from these matings is to be compared with the performance of Hereford, Angus, Brahman, and Brahman-Angus calves produced concurrently. The second phase of the experiment consists of a back-crossing program in which the crossbred calves will be mated to each of the parental breeds, the performance of the resulting calves again to be compared to the performance of straightbred calves produced concurrently. The third phase consists of mating the crossbred cows resulting from the first phase of the experiment to bulls of a third breed.

The Charbray bull used in this experiment is three quarters Charollais (an outstanding French breed of cattle) and one quarter Brahman. In some of the exploratory crosses this bull has produced some calves that have appeared very promising. The Brahman-Angus cattle are those produced at the Iberia Livestock Experiment Farm at Jeanerette over a 20-year period. Inclusion of these cattle in the crossbreeding program at Baton Rouge af-

fords an excellent opportunity to evaluate the attempt to develop a strain of cattle from a crossbred foundation.

—*R. A. Damon, Jr., C. B. Singletary, P. B. Brown, S. E. McCraine, T. M. DeRouen, R. M. Crown, and J. B. Francioni, Jr.*

Special Pasture Investigations

Combinations of fescue grass and crimson clover give an abundance of early grazing on hill land where the fertility is maintained at a relatively high level. This combination on the farm of A. E. Simpson in DeSoto Parish has produced as much as 482 pounds of beef per acre. The largest gains come from January 1 to June 15. Indications are that if fescue grass does not receive annual application of nitrogen it does not make early enough growths to have an advantage over our spring grasses.

Spring and summer applications of nitrogen on permanent pastures have increased the yield of forage and total beef production by 30 per cent even during dry summers. Bermuda grass that had received a nitrogen application was compared with Sudan grass for supplemental grazing. Last summer was so dry that the Sudan grass gave virtually no growth while the bermuda grass pastures carried a cow to the acre during the entire summer.

Oats and crimson clover utilized as a hog pasture on the farm of Roy Trammel in Allen Parish cut feed costs in half and produced animals of better quality than the ones fed on grain alone.

Indications are that Alyce clover is an ideal crop to use for fall farrowing pigs. Alyce clover on Mr. Trammel's farm gave lush grazing for the August and September farrowed pigs. At this season no other grazing crop was in a lush growing condition.

—*W. E. Monroe*

Crops and Soils

Cotton Genetics Studies

This project involves fundamental genetic studies of economic characteristics of the cotton plant. The information obtained should be of value in developing more effective methods of cotton breeding. The characteristics being studied include length, strength and fineness of fiber, resistance to *Fusarium* wilt disease, deterioration of fiber under field conditions, and yield of lint.

The research on inheritance of yielding ability will illustrate the type of work done on this project. Yield of lint per acre is a complex trait which is composed of several more or less independent conditions. It can be studied best by investigating each component condition separately and then determining how they interact to produce yield. In this research yield of lint per acre has been separated into four contributing traits: number of bolls per acre, number of seeds per boll, amount of surface area per seed (seed size), and weight of lint per unit of surface area. Each of these traits can be measured readily, and yield is the product of all four. A variety might be high in yield because of a high expression of any one of these characteristics or any combination of them. The results to date indicate that part of these traits, at least, are inherited independently of each other and thus can be combined in a cotton breeding program. An example of this is large size of seed and high weight of lint per unit area of seed surface.

The results of a yield trial of varieties at the St. Joseph Station illustrate the value of separating yield of lint per acre into individual components. The three highest yielding varieties in the test were DPL 15, Delfos 9169, and Fox. DPL 15 had a large number of bolls per acre and high weight of lint per unit area of seed surface but small seed. Its high yield was due to the expression of the first two components. On the other hand Delfos 9169 had only a medium number of bolls per acre and medium weight of lint per unit area of seed surface but had very large seed. Its exceptionally high yield was due to its very large seed size. The third variety, Fox, had a very high number of bolls per acre but only medium weight of lint per unit area of seed surface and small seed. Its high yield was due primarily to the production of more bolls per acre than any other variety in the test. The results suggest even higher yields might be obtained by developing varieties which are high in expression of all of these constituents.

—*M. T. Henderson, F. W. Self, J. E. Jones*

Cotton Varieties

Trials of commercial cotton varieties and new strains were conducted in 1951 on five Louisiana Experiment Station farms. These tests were located at Baton Rouge, Bossier City, Calhoun, St. Joseph, and Homer, Louisiana.

The leading varieties at Baton Rouge were Empire, Early Fluff, Smith 78, Louisiana 33, Delfos 9169-3316, Fox, Coker 100 WR, Stonewilt, Hybrid 56-4-M, Deltapine 15, Plains, and Delfos 9169; at Bossier City the leading varieties were Delfos 9169, Fox, Delfos 8274, Deltapine 8389-A, Early Fluff, Hybrid 56-4-M, and Deltapine 15; at Calhoun the leading varieties were Delfos 9169, Early Fluff, Paula 40, Deltapine 15, Smith 78, Stoneville 2B, and Delfos 9169-3316; at St. Joseph the leading varieties were Deltapine 15, Delfos 8274, Delfos 9169-3316, Fox, Delfos 8306, and Delfos 9169; and at Homer, 19 of the 20 varieties in the test did not differ significantly in yield of lint per acre.

Deltapine 15, Delfos 9169, Fox, Delfos 9169-3316, Delfos 8274, and Early Fluff produced comparatively high acre yield of lint in every experiment in which they were entered in 1951.

—*F. W. Self and Jack E. Jones*

Fertilizer Practices and Their Effect on the Production of Sugar Cane

The climatic conditions during 1951 were not favorable for the production of sugar cane. The extended drought during the early part of the season held the growth of cane to about half of what it should have been during these months. As a result the cane fertilizer data were erratic and in many cases different from what had been obtained in previous years. Such results as obtained in 1951, while valuable in a five-year average, do not give a true picture in many cases of what can be expected from applied fertilizers on sugar cane.

The addition of 60 pounds to second stubble cane on a Baldwin silt loam at Idlewild Dairy Farm resulted in an increase of 5.0 tons of cane per acre. This field had been in clover for a number of years prior to 1948, when it was put into cane. Previous work had shown a very high yield and little response to fertilizers. In 1951 the addition of 60 pounds of nitrogen proved to be as good a treatment as any other at this location.

Plant cane on the first bottom soils, Yahola very fine sandy loam and Mhoon silty clay loam did not respond to fertilizers in a consistent manner. There was a relatively small, but not statistically significant, response to nitrogen from plant cane on these soils.

Split Application of Nitrogen

The experiments on splitting the nitrogen application with half of it applied early in the spring and the remainder as anhydrous ammonia at lay-by have been continued.

The test on stubble cane at Youngsville on Lintonia silt loam soil showed some decided benefits from splitting the application of nitrogen in 1950. In 1951 little effect was noted from this practice. The cane crop did respond to the use of nitrogen in amounts higher than 60 pounds per acre, especially where 40 pounds of P_2O_5 and 60 pounds of K_2O were applied. Sixty pounds of nitrogen alone gave an increase of 9.0 tons of cane per acre over the check. The addition of 40 pounds of phosphate (P_2O_5) and 60 pounds of potash (K_2O) with 100 pounds of nitrogen increased the yield approximately 7 tons over that obtained from the 100 pounds of nitrogen alone, or 16 tons per acre over the check. Regardless of the manner of nitrogen application, phosphate and potash were essential for the best yields of cane. Rates up to 150 pounds of nitrogen alone did not increase the yield over the use of 100 pounds of nitrogen alone. The 150-40-60 treatment increased the yield 4 tons over the 100-40-60 level. In all treatments where 150 pounds of nitrogen were used the nitrogen was applied in split application so that no comparison of the value of splitting is available at this level.

Split applications of nitrogen on plant cane on Mhoon silty clay loam at Little Texas Plantation did not increase yields. At this location there was no significant response to any of the fertilizers used. Yields on the check plots were high, especially when compared with yields of unfertilized cane in the general area.

Magnesium in Sugar Cane Fertilization

In 1951 magnesium in three forms in the fertilizer mixture was applied at five locations. Three of these experiments were on plant cane and two on first stubble. Dolomitic lime, magnesium sulfate, and Sul-Po-Mag were used to supply magnesium.

In one experiment with stubble cane on a Baldwin silt loam there was a good response to 60 pounds of nitrogen and less efficient responses to higher levels of nitrogen. Magnesium was not effective in increasing cane tonnage or sucrose content over the yields obtained where the same ratios were used without magnesium. There was no consistent response to phosphate or potash at this location.

Magnesium did not increase the yield of cane or sugar on plant cane grown on a Lintonia silt loam. There was a significant response to the addition of 60 pounds of nitrogen in this test.

In the third test, using stubble cane on Baldwin silty clay loam, magnesium had no effect on the yield of cane or sugar. One

hundred pounds of nitrogen increased the yield significantly. No further increases were obtained from the use of phosphate or potash.

In studies with plant cane on Baldwin silt loam and Mhoon silty clay loam no response to any form of fertilization was obtained, and sucrose was apparently not influenced by fertilizer, but the sucrose content of the check and all treatments was low owing to adverse weather conditions.

Pre-Planting Fertilization

One test involving the addition of fertilizer to the soil prior to the planting of cane was conducted during 1951. The fertilizer was applied in the drill prior to planting of the cane. Additional amounts of fertilizer were applied to the crop in the normal manner the following spring. There was no indication that any advantage was gained by applying fertilizer prior to planting cane at this location. —*Jack D. DeMent and M. B. Sturgis*

Recommended Corn Hybrids

Tests of corn hybrids were conducted at eleven locations throughout the state. The basis for selection of the best adapted hybrid or hybrids for a given location should be the results from the test located on a soil and in a climatic area similar to the conditions where the corn is to be planted. The performance of hybrids for a period of years is more valuable than any one year's results. Detailed data on each test are given in Louisiana Agricultural Experiment Station Bulletin No. 461, January, 1952.

From the data given in the above bulletin, which contains results from the years 1949-1951, the following hybrids are recommended.

North Louisiana:

Dixie 11 (white)	Dixie 18 (yellow)
La. 468 (white)	*N.C. 27 (yellow)
Funk's G-780W (white)	*Dixie 22 (yellow)
Coker's Coastal 811 (white)	Funk's G-714A (yellow)

South Louisiana:

La. 521 (white)	Funk's G-737 (yellow)
Dixie 18	

Dixie 18 is recommended for silage throughout the state.

—*Hugo Stoneberg, H. W. Ivy, C. B. Haddon, D. M. Johns, R. S. Woodward, J. Y. Oakes, and H. D. Ellzey, Jr.*

* These hybrids have good yielding ability but they should be harvested early, for their husk is not ample.

Corn Hybrid Seed Stocks

The Louisiana Agricultural Experiment Station has been assisting members of the Louisiana Hybrid Seed Corn Growers Association, Inc. in increasing seed stocks of the hybrids released by the Experiment Station. This consists of maintaining inbreds and single-cross production. There is ample single-cross seed on hand to increase double-cross production in 1952.

In 1951 members of the Louisiana Hybrid Seed Corn Growers Association produced approximately 15,000 bushels of hybrid seed corn. This will plant 90 to 100 thousand acres of corn.

Louisiana seed growers cannot fill the demand for some of the more desirable hybrids. In 1952 an effort will be made to increase the acreage of the better adapted hybrids. —H. W. Ivy, Jr.

Adaptations of Forage Species

Tests with Clovers

The tests with the four species of clover (*T. repens*, *T. pratense*, *T. incarnatum*, and *T. subterranean*) contained many of the varieties and strains of which seed are available on the market. The winter of 1950-51 was most severe for the area and the results are somewhat different from those found in previous years. With crimson clover the difference in forage yield of the strains was insignificant for choosing a strain to plant. On the other hand, observations on the plots in January, 1952 might differentiate certain entries on reseeding ability. Briefly, all strains sold on the market as reseeding crimson clover came back better from the seed which were produced the preceding spring than did common crimson.

Subterranean clover produced about the same tonnage of forage as crimson. It lasted nearly one month later in the spring and reseeded about as well as crimson. While this species cannot be classed as being especially adapted to poorly drained soils, it has performed better on soils which become waterlogged during winter and spring than has crimson or red clover. Strains included in the test were Tallarook, Mt. Barker, Bacchus Marsh, and Nangeela. The past season's performance would not suggest that a choice could be made among these except on the availability of a supply of seed.

Red clover does not grow off as rapidly from the seedling stage as either crimson or "sub" clover. It grows much later into the summer than either, and when the plants live over affords pasture much earlier the second fall. The strains tested were Louisiana Red (regional strain), Louisiana Station 1, Louisiana

Station 2, Kenland, Midland, and Tennessee Purple Seed. Only one forage harvest was made and that was during the month of May. The local strains were superior to the others. Kenland appeared to be the best adapted of those from out of state.

White clover is more like red clover in the seasonal growth habits. It does not develop rapidly from the seedling stage but continues to grow later in the spring and summer months. White clover is widely scattered over the world and certain definite types have arisen from different areas. Tests conducted at Baton Rouge including these different types have demonstrated the importance of choosing an adapted variety or strain to plant. The severe winter of 1951 also made it appear that additional factors for winter hardiness could be a very profitable addition to the Louisiana strains, especially if the range in adaptation should be extended northward. Ladino is more tolerant to cold, but it produces very few blossoms in the area and of course a correspondingly light seed crop. Louisiana white clover is definitely superior to New Zealand white clover. The new strain, Louisiana White Clover S-1, was superior to both Ladino and the parent variety, Louisiana white clover.

Grasses for Winter Grazing

Three species of brome grass are on trial for determining the best suited for this area. There is also more than one strain of each. Of the species *B. enermis*, *B. catharticus* and *B. marginatus*; *B. catharticus*, or rescue grass, gave the most yield from the time of emergence in October until January 15, 1952. Prairie brome grass was probably the most outstanding of this species. Later in the spring certain other entries from other species may perform better. It is considered worthwhile to call attention to a species of grass belonging to another genus, *Phalaris minor*. It is one of the Canary grasses. Observations during the past two years lead to a favorable impression regarding it.

Five strains of tall fescue grass were planted in October. Forage harvested January 15, 1952, indicates that little differences exist between them. Those included were Kentucky 31, Alta, Alta 144, Alta 4-36, and Goar. Previous years' experiments with this grass have shown it to be lacking in persistence. It is a perennial and is fairly easily established. Most of the stand is lost during the ensuing summer season.

The rye grass strain test contained two strains of annual rye grass and perennial rye grass. The yield in pounds of hay (15 per cent moisture) per acre was 2,160 for common rye grass; 2,117 for Strain 12; and 1,829 pounds for perennial rye grass.

Summer Grasses

Summer grasses produced very little growth during the summer of 1951. None have been tested which appeared to be superior to Dallis grass or bermuda grass for average conditions in South Louisiana. —C. L. Mondart, Jr.,* D. R. Melville, and C. R. Owen

Breeding New Varieties of White Clover for Louisiana

Seed of a new variety of white clover was released to farmers for increasing in the fall of 1951. The amount of seed released was only enough to plant about 50 acres. The new variety is known as Louisiana White Clover S-1. This variety was described in the 1949-50 *Annual Report* of the Louisiana Agricultural Experiment Station, pp. 51-52. It was also described in the *Southern Seedsman*, page 26, October, 1951.

The acreage planted for the production of foundation seed has been expanded during the season of 1950 and 1951. It is expected that this additional acreage will materially augment the supply of seed to be made available to farmers of Louisiana for planting during the fall of 1952. Foundation seed are produced on the farms of the Agricultural Experiment Station. Seed are sold only to those farmers who wish to participate in the program to increase the seed supply of this variety. The seed are released through the Crop Improvement Association.

An effort is being made for the full evaluation of the clonal lines which are used in the formation of new varieties. Forage yield trials were conducted with the polycross seed from each of eleven lines. These polycrosses were compared with the parent variety (Louisiana white), Ladino, and the new synthetic variety. Forage yields were taken May 21, 1951, but no additional clippings were taken during the summer months. A second harvest was made from the plots January 15, 1951. Forage production for the entire group was much higher in May than in January, as was to be expected. Late fall and early winter forage yields are excellent criteria for determining the degree of summer survival in white clover. For example, the parent variety, Louisiana white, did not continue to live through the summer but came back largely by reseeding. Ladino survived to some extent but was thin on the ground when the hot dry weather was past. Louisiana white clover produced 275 pounds dry matter per acre; Ladino, 604 pounds; while the synthetic variety, Louisiana S-1, yielded 1,100 pounds and certain of the polycross entries produced 1,325 pounds of dry

* On military leave

matter per acre. The forage harvested January 15 contained an average of 17.4 per cent dry matter.

Ladino clover does not blossom normally in South Louisiana, not even enough to provide sufficient seed for reseeding. Greenhouse experiments showed that this was due to the light period provided under natural conditions. When the period of light was extended to about 15 hours, blossoms were found to occur at about equal frequency as in Louisiana white clover during the peak of blossoming in early spring. Extended light period was used in making crosses between Ladino and some of the lines isolated from native stocks. —*C. R. Owen*

Dallis Grass Breeding

The initial phase of the research work with Dallis grass was terminated with the publication of the major results in May, 1951, Bulletin 449, "Improvement of Native Dallis Grass in Louisiana." During this program, a number of superior biotypes were isolated. Additional tests in subsequent seasons provided information whereby all but two strains were eliminated. Seed of these have been released to farmers of Louisiana through the Crop Improvement Association for increasing. Within two or three years, seed of these improved strains of Dallis grass will be available in quantity.

A second phase of the work is now under way. The plan is to utilize the superior biotypes for making additional improvement in seed production and to develop new strains that are more highly fertile. An indication of the possibility for success was shown in the progeny test planted from selections made within certain of the new strains. Plants were selected from the new strain B230 and classified on the basis of pure seed content produced. The results from the experiment suggest fairly definitely that variation in pure seed content is inherited, although influenced somewhat by environment. The pure seed content of the parent strain (B230) was 30.5 per cent; that for the progenies of selected plants ranged from 15.9 per cent to 36.6.

During the 1951 season these tests were continued. Seed harvests were made from each test at the time the seed were considered to be at the proper stage of maturity. The grass was planted in rows. It was side-dressed with 400 pounds of 8-8-8 fertilizer per acre early in April and with nitrogen fertilizer after the seed harvests later in the season. The total yield of seed in pounds per acre was 700 pounds. Solid stands of grass planted with the same strains and fertilized as well but mowed for weed control produced seed in late August only. Less than one-third the yield of cultivated grass was harvested from these blocks with solid

stands. Unfavorable seasonal conditions for seed development during the spring and summer was no doubt the principal reason for the extreme magnitude of the difference in seed yields from the two cultural methods. Higher yields of seed have been produced from grass planted in rows than from solid stands during other seasons. In normal seasons, the difference in favor of row planting and cultivation was only about 50 per cent. —*C. R. Owen*

Effects of Sodium Fertilizers on Yields of Cotton

The comparative value of nitrate of soda as a source of nitrogen and the role of sodium as a substitute for potassium in the growth of cotton have been studied for the past five years on six different soil types in fifteen experiments in the cotton areas of Louisiana. The experiments were conducted at the Experiment Station and with individual farmers. A randomized block design with three replications and 0.32-acre plots was used. The experiments were located in soil areas of medium acidity and of low potash availability.

Widely varied rainfall or seasonal conditions occurred during the five-year period, and the yields as influenced by weather varied from less than normal to higher than average.

In general, nitrate of soda gave significantly higher yields than ammonium nitrate when only nitrogen was applied. In ten of the fifteen experiments nitrate of soda increased the yield of seed cotton more than did ammonium nitrate when applied with phosphate and potash. In six of the fifteen experiments nitrate of soda increased the yields more than ammonium nitrate when nitrogen was applied with potash. As indicated above, nitrate of soda apparently improved the availability of soil phosphate. The results also point to the value of sodium as a substitute for potassium in functions common to the basic ions, or to value of sodium as an essential element in the growth of cotton. The addition of sodium as the chloride to mixtures containing ammonium nitrate and superphosphate increased the yields of cotton in four experiments. The addition of sodium chloride to complete mixtures of ammonium nitrate, superphosphate, and muriate of potash increased the yields in six experiments. The application of Na_2O equivalent to 24 pounds of K_2O per acre was the most effective sodium chloride treatment. The 1951 results lend further indirect evidence to the support of sodium as a nutrient element. Nitrate of soda in complete mixtures with either Sul-Po-Mag or dolomitic limestone gave higher yields than mixtures containing ammonium nitrate as a source of nitrogen.

—*James Gregg Marshall and M. B. Sturgis*

Fertilizer Experiments with Corn

Outfield fertilizer experiments with corn were conducted in cooperation with individual growers under ordinary farm conditions. The nitrogen was applied at the rates of 48, 72, and 96 pounds per acre as side-dressing and in combination with phosphate and potash applied before planting.

The highest yield obtained in 1951 was 95.7 bushels from the application of 300 pounds of 5-10-10 per acre before planting followed by 81 pounds of nitrogen as side-dressing to corn on Olivier silt loam at Mer Rouge. Nitrogen applications profitably increased the yields in all experiments; however, in all tests the higher yields were obtained where nitrogen was applied in combination with phosphate and potash.

The response to phosphate was not as marked as that of nitrogen. In two experiments harvested in 1951, one on Olivier silt loam at Mer Rouge and the other on Olivier silt loam at Opelousas, there was a significant response to phosphate applied at the rate of 30 pounds P_2O_5 per acre. The corn also showed good response to the application of 30 pounds of K_2O per acre.

—James Gregg Marshall

The Response of Alyce Clover to Liming Materials, Varying Increments of Potash, and Minor Elements on Olivier Silt Loam

A greenhouse study of the response of Alyce clover on Olivier silt loam to magnesium and calcium lime materials, to varying additions of potash, and to the minor elements was made in 1951. The clover responded to all liming materials. Dolomitic lime and magnesium carbonate were highly significantly better than calcium carbonate as oyster shell flour. The crop responded to potash at the 120-pound level but not at the 180-pound-per-acre level. This shows that the balance between magnesium and potassium may be important. There was no response to the application of the minor elements.

This year's work indicates that in areas of Olivier silt loam where the pH is below 5.5 and the exchangeable magnesium is low, in the order of 100 ppm, the soil needs lime for Alyce clover, and magnesium lime materials should be used. The choice of lime materials is of great practical importance, particularly when magnesium must be added.

The work for the future includes a more definite effort to locate the magnesium deficient areas in the state, to more definitely determine levels of magnesium in the soils at which responses to magnesium can be expected for certain crops, and to determine

the value of different liming materials in relation to responses to different phosphate materials. The studies will also include the effects of liming materials on the absorption of potassium, magnesium, calcium, and phosphorus by the crop.

—*Charles W. McMichael and R. H. Brupbacher*

The Soil Testing Laboratory

About 7,200 samples were analyzed by the laboratory during 1951. There was an increase of about 800 over the number analyzed in 1950. In the fall of 1951, the analysis of subsoil samples was discontinued except on special request. This was done because it has been found that most of the recommendations are not materially influenced by the composition of the subsoil. By analyzing surface soils only, the laboratory will be able to get the results out more quickly and permit more farmers to get samples analyzed.

All moderately and strongly acid soils are now being analyzed for available magnesium. This analysis should help answer some of the controversy concerning the kinds of liming materials that should be recommended. Where the available calcium and magnesium are low, it is recommended that at least half of the lime applied be in the form of dolomitic limestone. On soils where the available calcium and the soil reaction are high enough, but where available magnesium is low, recommendations can be made for the use of some of the other magnesium salts. —*W. J. Peevy, R. H. Brupbacher, C. W. McMichael, and Monroe C. Lutrick*

Depth-of-Turning Studies on Rice Land

America's last great soil resource is found in the deep unplowed layers of the land. One of our important unsolved problems is how to effectively use a greater volume of soil for the growth of plants. Often the soil beneath the plowed layer has a greater supply of elements essential for the growth of plants than has the plowed layer. Results in the past where a greater volume of soil was turned in an effort to increase root penetration have been inconclusive, as yields were in some instances increased and in others decreased. The purpose of this investigation was to determine how breaking compacted layers beneath the plowed zone affected rice yields and to investigate soil factors responsible for the increased or decreased yields.

Field plots on the Rice Experiment Station were turned at depths of 3, 6 and 8 inches. Half the plots received no fertilizer and half received 300 pounds of 8-8-8 per acre. Century rice was planted on all plots.

The deep plowed plots were exceptionally cloddy at planting as no rain fell from turning until planting time; this hampered

seedbed preparation. Because of the poor seedbed on the deep plots the stand was much poorer than on the three-inch-depth plots. The yields from the eight-inch-depth plots were discarded as the stand was exceptionally poor. Rice matured earlier on the shallow plots, and since the water had to be removed from all the plots when the earliest rice began to mature, yields tended to favor the shallow plots. The fertilized plots had mean yields of 15.7 and 15.1 barrels per acre for the three- and six-inch plots. The means for the unfertilized plots were 12.8 and 13.6 barrels per acre for the three- and six-inch depths respectively. Thus there appears to be a trend toward increased yields with greater depth on unfertilized plots, with the trend being reversed on fertilized plots.

Many growers believe that deep turning causes a greater infestation of red rice. Red rice counts were made on all plots. The red rice population seemed to be largely localized in certain areas of the field without regard to depth of turning.

—*C. E. Scarsbrook and R. K. Walker*

Depth to Plow Pan as a Factor in Sugar Cane Production

Plots receiving no fertilizer in field experiments with sugar cane in Louisiana have often shown little relationship between yields and native soil fertility as shown by soil tests. Likewise, the application of fertilizers has not always given the anticipated responses. The use of heavy cultivating and harvesting equipment was believed to have adversely affected the physical condition of soils devoted to the culture of cane. It seemed probable that some soil physical factor or factors were limiting the use by the plant of fertilizer elements present in the soil.

An investigation was made on Mississippi River first bottom and terrace soils at eight locations where fertilizer experiments were being conducted. The plots studied at each site were those receiving no fertilizer and those receiving 100 pounds of N, 40 pounds of P_2O_5 , and 60 pounds of K_2O per acre, this being the highest rate of fertilizer used in the tests.

It was observed in all plots sampled that there was a plow pan. This compacted zone largely restricted the root growth to the soil above the pan. The depth to this plow pan was measured from the top of the row.

At all locations except one, as the depth to the plow pan of unfertilized plots increased, the yield increased. The one location that failed to fit this depth-yield relationship was found to be on a deep soil with a very low fertility status. The exchangeable calcium and potassium, organic matter, pH, and available phosphorus of this soil were all much lower than in any of the other soils investigated. This suggests that the influence of a plow pan or

compacted layer on yield may be obscured when the fertility is very low. The very high fertility status of some of the soils seemed to have no influence on the depth to plow pan-yield relationship.

It appeared to be generally true that as depth to the plow pan increased, there was less yield return from added fertilizers; however, a definite relationship was not established. In the deep soils the plant can possibly obtain the necessary elements for growth, whereas in the shallow soils the plant cannot obtain sufficient elements for maximum growth without the addition of fertilizers. On the other hand, increasing the depth to the compacted layer would likely increase the response from fertilizer when moisture is a limiting factor.

—*C. E. Scarsbrook, J. D. DeMent and M. B. Sturgis*

A Chemical and Mineralogical Study of the Soils of St. Mary Parish

St. Mary Parish is one of the largest sugar cane producing parishes of the state, and a better understanding of the soils is advantageous to soil classification, fertilizer utilization, crop rotation, and farm planning.

The soils of this parish are derived from Mississippi and Red River depositions. Since the major soil constituents derived originally from igneous rocks have been modified or changed entirely by time and environment, it is difficult to distinguish between the inherited characteristics and those acquired. The general purpose of the chemical and mineralogical study is to establish a base whereby various soil profiles may be compared and also to establish fundamental facts and data that can be utilized in soil classification.

Studies with a Geiger counter X-ray spectrometer made at Pennsylvania State College have made possible the identification of the clay minerals. Certain soil profiles from the Iberia, Buxin, and Baldwin series have been studied by X-ray and chemical methods. X-ray patterns of the clay fraction show greater mineralogical similarity between profiles of the same series than profiles of different series. Although the predominating minerals in the clay of all series are quartz, montmorillonite, hydrous mica, and kaolin, the relative proportion of each is characteristic for the series. Iberia profiles contain larger quantities of montmorillonite than Buxin or Baldwin. Chemical analyses of the clay fraction indicate, in general, that the profiles of Buxin contain larger quantities of the oxides of iron, aluminum, manganese, sodium, and magnesium and smaller quantities of silica than Iberia or Baldwin. Profiles of Iberia are high in calcium, while Baldwin profiles are very low.

A detailed report of the X-ray, chemical, and physical charac-

teristics of these series will appear later. It seems evident that individual similarities exist within profiles of the same series. The mineralogical differences between series are due to differences in parent material or to differences in the stage of development.

—*B. N. Driskell*

The Effect of the Other Basic Ions on the Absorption of Potassium by White Clover on Olivier Silt Loam

A greenhouse study has been made of the affects of other basic nutrient ions on the absorption of potassium by white clover, of the effect of the potassium ion on the absorption of the other ions, and of the effects of the different cations on yields of successive cuttings of white clover.

An acidic soil, Olivier silt loam, low in available potassium and other bases was used for this greenhouse study. Dolomite, calcium carbonate, and magnesium carbonate at the equivalent rate of 3,000 pounds per acre of dolomite and a treatment receiving no lime were all used with levels of potash in a factorial design. In addition to these 16 treatments, a check and three treatments employing sodium instead of potash were used. All treatments except the check received the equivalents of 30 pounds of nitrogen and 120 pounds of P_2O_5 per acre.

For the total period of growth, the dolomite, calcium carbonate, magnesium carbonate, and no lime treatments averaged 5,770, 4,890, 3,150 and 3,550 pounds of air dry clover per acre, respectively. The yields from the dolomite treatments were significantly better than the calcium carbonate treatment yields, and both of these treatment yields were higher than the magnesium carbonate and no lime treatment yields.

The equivalent of 120 pounds of potash per acre added to soil to which dolomite had also been added, increased the yield over dolomite alone by 1,750 pounds per acre. A similar increase occurred when potash was added to soil receiving calcium carbonate.

Because of the marked response to potash additions at high levels of calcium and magnesium and the lack of response to potash at lower levels of these two elements, significant interaction between the nutrient ions calcium and potassium occurred. Interaction may have occurred between magnesium and potassium in the dolomite treatments.

The amount of each cation absorbed by the clover was closely correlated with the amount available in the soil. As expected, the amounts of potassium absorbed were very closely related to additions of potash to the soil. An application of 120 pounds per acre almost doubled the potassium intake. Potassium also influenced

the intake of calcium, magnesium, and sodium. When the amounts of each of these nutrients were held constant, increases in the soil's supply of potassium resulted in decreases in the uptake of each of the other ions. Even when magnesium was added in an amount high enough to be toxic, the addition of 120 pounds of potash per acre caused a decrease of 16 per cent in the amount of magnesium absorbed by the clover. The application of sodium increased the yield of clover. The increase was not quite statistically significant. In treatments receiving no potassium or small additions of potassium, the sodium content of the plant was high. The clover on treatments receiving larger amounts of potassium had smaller contents of sodium. When the potassium level in the soil was low, sodium may have been of value in replacing potassium in some of the necessary growth functions that can be performed by either nutrient. Calcium additions tended to lessen the potassium content of the clover. Magnesium additions did not decrease the content of potassium in the clover.

Detailed data on each of the four harvests show a luxury absorption of potassium at first and second harvests. This indicates the importance of more frequent applications rather than larger applications of potassium.

—*W. H. Patrick and M. B. Sturgis*

Soil Surveys and Soil Studies in St. Mary, Terrebonne, and Bossier Parishes

Two hundred seventy-five thousand acres of land were surveyed in St. Mary Parish during 1951, and the detailed soil survey of this parish was completed. A detailed soil survey was begun in Terrebonne Parish, and 18,000 acres have been mapped. Preliminary work has been completed for the detailed soil survey of Bossier Parish, and 1,600 acres have been mapped in this parish.

The chemical and mineralogical data obtained through the laboratory work on profile analyses are being used in correlating the field work of soil classification. The laboratory work includes soil profile analyses for total constituents, for exchange properties, for types of clay minerals, and for soluble salts by horizons in the principal soil types mapped.

The basic soil survey data and chemical and mineralogical data being collected on soil types are being used as a basis for better land use and for improving varietal adaptations and fertilizer practices. The farmers will save thousands of dollars through use of the data showing adequate amounts of magnesium in the soils. Before these data were obtained, magnesium was considered to be widely deficient and farmers were planning to add magnesium to the soils.

The soil surveys were initiated by the Department of Agronomy, Louisiana Agricultural Experiment Station. This is a cooperative program with the United States Department of Agriculture, Bureau of Plant Industry, Division of Soil Survey. The survey reports will be published as regular reports of the Division of Soil Survey. —S. A. Lytle, B. F. Grafton, B. N. Driskell, H. L. Hill, T. W. Green, and C. W. McMichael

Some Microorganisms Involved in Certain Nitrogen Transformations in Soil of the Louisiana Rice Area

Flooding Crowley silt loam soil with water for 15 weeks caused the loss by volatilization of 78 p.p.m., or 8 per cent of the nitrogen present. Where clover had been added to the soil, 11.7 per cent of the nitrogen was lost, and in soil containing rice straw the loss was 9.8 per cent. No significant changes in total nitrogen occurred in the soil kept at optimum moisture. The reaction of the flooded soil and of the flood water increased from pH 5.6 to 7.0 or above during the 15 weeks. The nitrate-reduction capacity of the soil, determined in a potassium nitrate medium, was increased by the addition of organic matter and by flooding. The principal nitrate-reducing organisms present were a *Penicillium* spp. and a *Bacillus* spp. Using one ml. of a 1:25 suspension of soil in the nitrate medium, the largest amount of ammonia produced by nitrate reduction occurred from flooded soil containing white clover.

The three principal nitrogen-fixing aerobic microorganisms in the soil were *Aerobacter aerogenes*, *Agrobacterium radiobacter* and *Actinomyces sphaerulosus*. The numbers of all these organisms were significantly reduced by flooding the soil and increased by adding organic matter if the soil was kept at optimum moisture. The beneficial influence of organic matter on these organisms did not occur in the flooded soil. The numbers of anaerobic nitrogen-fixing bacteria were increased by additions of both kinds of organic matter and by flooding the soil. Although all the nitrogen-fixing organisms made satisfactory growth on a nitrogen-free medium, none fixed appreciable quantities of atmospheric nitrogen in the laboratory in solution cultures.

Flooding the soil resulted in the loss of nitrogen by volatilization, raised the pH, and increased the nitrate-reduction capacity of the soil. Flooding the soil containing easily decomposable organic matter increased those nitrate-reducing organisms that produced large amounts of ammonia from nitrates.

—Joe E. Sedberry and W. H. Willis

Dairy Research

Heat Tolerance Studies

Blood Studies of Red Sindhi — Jersey Crosses

It has been claimed that the level of certain blood constituents may be used as a guide in evaluating the adaptability of animals to a given environment. Blood analyses for hemoglobin, packed red blood cells (hematocrit), plasma calcium, and plasma inorganic phosphorus of 16 Sindhi-Jersey daughters and their Jersey dams were determined monthly over a two-year period. The mean values for the Sindhi-Jersey crosses and their Jersey dams were: hematocrit 35.23 ± 0.28 and 29.95 ± 0.24 per cent; hemoglobin, 10.26 ± 0.06 and 9.60 ± 0.05 gm. per cent; calcium 9.63 ± 0.07 and 9.60 ± 0.06 mg. per cent plasma, and phosphorus 7.58 ± 0.08 and 5.38 ± 0.04 mg. per cent plasma. The higher values of the crosses over the purebreds were found to be highly significant at $P = .01$. The difference between the crosses and purebreds for inorganic phosphorus was found to be mainly due to age, while the differences for hematocrit and hemoglobin values are probably due to a breed difference. There was no evidence of any seasonal variation in any of the blood levels of the Sindhi-Jersey crosses or their Jersey dams. Inorganic phosphorus levels were highest in the young Sindhi-Jersey crosses and gradually decreased with an increase in age.

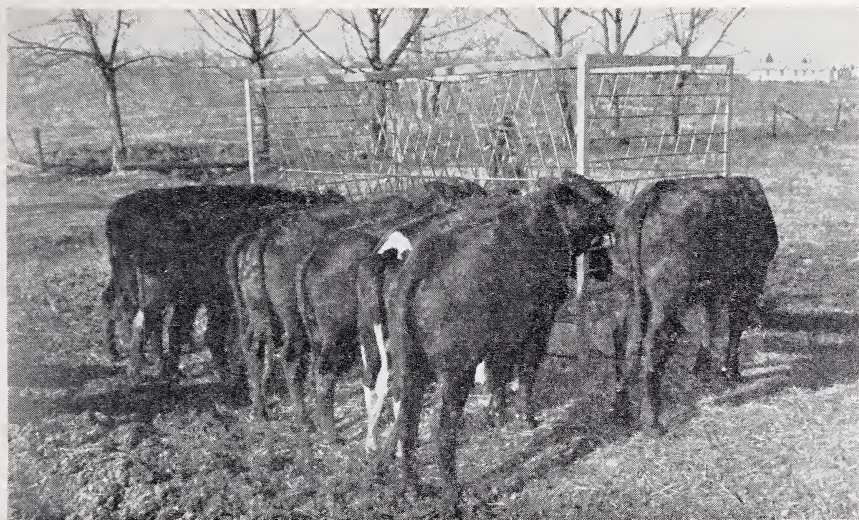
—*L. L. Rusoff, J. B. Frye, Jr., and G. W. Scott, Jr.**

Grazing Performance of Sindhi Crossbred and Purebred Cattle

Two studies on the grazing performance of crossbred and purebred dairy animals were conducted during the summer of 1951. The first study was conducted with 15 yearling heifers (5 $\frac{1}{2}$ Sindhi- $\frac{1}{2}$ Holstein crosses, 5 Holsteins, and 5 Jerseys) for 14 days during which time the average maximum temperature was 94° F. and the relative humidity was 63 per cent. The crossbreds grazed 43 per cent and 41 per cent more than did the Holsteins and Jerseys, respectively, during the day when the sun was shining. There was practically no difference among the breeds in grazing time when it was cloudy. The crosses grazed 11 per cent and 12 per cent more than did the Holsteins and Jerseys, respectively, for a 24-hour period.

The second study was conducted with 12 yearling bulls (3

* B.D.I., Iberia Livestock Exp. Sta., Jeanerette, La.



Group of 15-month-old $\frac{1}{2}$ Red Sindhi- $\frac{1}{2}$ Holstein heifers used in grazing studies at the Station.

$\frac{1}{2}$ Sindhi- $\frac{1}{2}$ Holstein crosses, 3 $\frac{1}{2}$ Sindhi- $\frac{1}{2}$ Jersey crosses, 3 Holsteins, and 3 Jerseys) for 8 days during which time the average maximum temperature was 87° F. and the relative humidity was 52 per cent. The Sindhi-Holstein crosses grazed 17 per cent more than did the Holsteins during the day, while the Holsteins grazed 24 per cent more than the crosses at night. The average grazing rate for a 24-hour period was approximately the same for all animals.

These studies indicate that the crossbreds have no particular grazing advantage over the purebreds as long as environmental temperatures do not exceed 87° F. with a relative humidity of 52 per cent. —*G. D. Miller, J. B. Frye, Jr., and B. J. Burch, Jr.*

Effects of Seasonal Environmental Changes on Dairy Bulls in a Subtropical Area

Fourteen dairy bulls, including 4 Jerseys, 5 Holsteins, and 5 Guernseys, were studied for a 53-week period commencing November 26, 1950, and ending November 30, 1951. The bulls were in outside paddocks, each having free access to a 0.9 acre pasture lot. Daily observations of body temperature, respiration rate, pulse rate, and air temperature were made. Semen samples were collected weekly and the following characteristics evaluated: (1) per cent motile spermatozoa; (2) per cent morphologically abnormal spermatozoa; and (3) concentration of spermatozoa. Seasonal periods and mean maximum air temperatures for each period were as follows: winter (November 26 — February 24), 60° F.;

spring (February 26 — May 26), 75° F.; summer (May 27 — September 8), 90° F.; and fall (September 9 — November 30), 76° F.

The mean, 53-week body temperature for all bulls was 101.0° F. Seasonal mean body temperatures showed only slight variations among breeds, ranging from a low of 100.8° F. (winter) for the Guernseys to a high of 101.3° F. (summer) for the Holsteins. However, weekly averages for the Holsteins during August reached a maximum of 102.6° F. Mean seasonal respiration rates per minute for all bulls were: winter, 14; spring, 22; summer, 55; and fall, 32. There were no significant breed differences in respiration rate. Pulse rates were lowest in the winter (52/min.) and highest in the spring (62/min.) for all bulls. Semen characteristics data indicated that the highest quality semen was produced during the winter and spring and the poorest quality during the summer and fall. The reduction in semen quality was primarily due to an increase in per cent morphologically abnormal spermatozoa. These defects were noted in bulls of all breeds but were most marked in those of the Holstein breed. Only one bull, an aged Holstein, showed definite evidence of a temperature-induced reduction in spermatozoa concentration.

The evidence accumulated during this study indicates that one of the greatest problems encountered in producing semen for use in artificial insemination under Louisiana conditions is the increase in per cent morphologically abnormal spermatozoa during summer and fall months. This problem results in the removal of some bulls from service and the curtailment of use of others during this period. Further studies are being conducted in an effort to devise means of preventing such losses.

—*J. E. Johnston and Cecil Branton*

Artificial Breeding Studies

Proper Handling of Dairy Bulls Results in Increased Quantity and Quality of Semen

The widespread use of the semen of a dairy bull in artificial breeding makes it necessary that a bull's semen production be as efficient as possible. Although it has been the opinion of many that a relationship exists between the level of sexual excitement attained before the bull is allowed to serve the artificial vagina and efficiency in semen production, only limited experimental data have been reported. Therefore, two experiments were conducted to relate semen production and fertility to the following levels of sexual excitement: (A) no restraint, (B) one false mount, and (C) two false mounts prior to service. In the first experiment in which six mature dairy bulls were used over an 18-week period

only one ejaculate was collected at each weekly collection period. During the second 18-week experiment in which nine mature dairy bulls were used two ejaculates were collected at each weekly collection period.

The results for the first experiment showed that the average volume per ejaculate for a bull was increased by 33 per cent, the total number of spermatozoa per ejaculate by 42 per cent, and the number of motile spermatozoa by 50 per cent when he was properly restrained or excited prior to service (one or two false mounts) as compared with not restraining him. Similar results were obtained from the second experiment for first ejaculates; however, second ejaculates were not affected. The fertility of the semen showed no relation to the level of sexual excitement of the bulls. The increases in semen production and quality as found in these two experiments were not only statistically highly significant but are also of practical value to a bull stud, because they result in more efficient semen production and utilization of valuable dairy bulls. As a result of these experiments, the routine practice in collecting semen from most bulls at the L. S. U. Dairy Improvement Center is to use one false mount prior to service.

—*Cecil Branton and Gerald D'Arensbourg*

Bull Semen Apparently Can Be Diluted at High Rates

Experimental results from L. S. U. and other stations have made it possible to successfully breed many cows with a single ejaculate or service from a bull. However, it may be possible to obtain good results by using semen dilution rates much higher than those now in use. In a preliminary experiment, fertility data based on percentages of 60-90 day non-returns to first services to semen diluted to contain 2, 4, 6, 8, and 10 million motile spermatozoa per ml. of diluted semen were 58, 54, 60, 63, and 59 per cent, respectively. A total of 1701 services were involved. The differences in fertility were not mathematically significant. Further investigations seem to be warranted.

—*Cecil Branton, M. H. Newsom, and T. E. Patrick*

Antibacterial Agents Control the Bacteria Flora of Bull Semen

The following investigations were made to: (1) determine the total aerobic and anaerobic bacterial counts and types of bacteria in fresh undiluted semen from bulls of high and low fertility; (2) study the effects caused by sulfanilamide, penicillin, and streptomycin on microbial flora of semen, and (3) determine the time required for these antibacterial agents to eliminate the microbial flora in the semen of high and low fertility bulls.

No relationship was found between the total bacterial counts and the fertility of bulls. Aerobic counts ranging from 6,800 to

3,000,000 organisms per ml. of semen were found in the highly fertile group, with an average of 620,000. A low of 650 and a high of 2,900,000 anaerobic colonies were recorded for this group, with an average of 290,000. For the low fertility bulls the aerobic counts ranged from 11,000 to 3,500,000 organisms per ml. of semen, with an average of 530,000; whereas, the anaerobic counts ranged from 1,500 to 490,000 per ml., with an average of 71,600.

Diphtheroids were the predominant types of organisms isolated from the semen of both groups of bulls. Other bacteria isolated in this study were species of the genera *Pseudomonas*, *Streptococcus*, *Proteus*, *Bacillus*, *Alcaligenes*, *Micrococcus*, and *Serratia*. In addition to these, coliform bacteria and a few yeasts, molds, and actinomyces were found. None of these organisms except *Pseudomonas* and hemolytic bacteria, when present in large numbers, could be related to the fertility of the semen from which they were isolated. The appearance of a large number of *Pseudomonas* in the semen of one bull was correlated with a decrease in the fertility of the semen in spite of the antibacterial agents used.

When used singly, it was found that streptomycin was the best antibacterial agent for the control of bacteria in semen stored at 40° F. for 24 hours. Penicillin was almost as good as streptomycin if no Gram negative rods were present. Sulfanilamide was inferior to both penicillin and streptomycin. A combination of the three antibacterial agents effected a more complete elimination of the bacterial flora than any one or a combination of these two. The bacterial flora of the semen was completely eliminated within 5 to 8 hours after dilution of the semen when a combination of the antibacterial agents was added and the semen was stored at 40° F. Thus, under routine operations, when the breeding technician receives his shipment of bull semen, the bacterial flora is completely eliminated. This not only increases the vitality of the spermatozoa but also improves the fertility of the semen of many bulls, as previous studies have shown.

—W. D. Coleman,¹ John A. Alford,¹ Cecil Branton, J. E. Johnston

Relationship Between Semen Quality Tests and Fertility of Bull Semen

Two hundred eighty-seven semen samples from 15 bulls of the Jersey, Guernsey, and Holstein breeds were used in breeding 5,554 first service cows. Only semen samples meeting or surpassing the following minimum semen quality standards were used in these breedings: (1) Initial motility 50 per cent; (2) spermatozoa concentration 500 million per c.c.; (3) methylene blue reduction time less than 9 minutes. Semen was diluted on the basis of 12 million motile spermatozoa per c.c. for use in insemination.

¹Staff members of the Botany, Bacteriology and Plant Pathology Department.

nation. Each semen sample was evaluated by means of the following semen quality tests: (a) percentage of live spermatozoa; (b) percentage of spermatozoa surviving a 0° C. cold shock; (c) initial percent motility; (d) concentration of spermatozoa; (e) methylene blue reduction time. Fertility was measured on the basis of percent 60-90 day non-returns to first service and averaged 70.2 per cent for all samples in this study.

Coefficients of correlation were determined between each of the quality tests and the fertility estimates on a total, among bull and within bull basis. The coefficients of correlation between methylene blue reduction time of the total (-0.19) and within bull (-0.24) bases were statistically significant at the 5 per cent level of probability. None of the other coefficients of correlation approached statistical significance. These results indicate that when semen is selected to meet or surpass the minimum quality standards used here and diluted on the basis of 12 million motile spermatozoa per c.c. nearly all detectable poor fertility semen is eliminated. —*J. E. Johnston and Fred Hathorn*

Antibiotics for Dairy Animals

Antibiotic Aureomycin of Value to Older Calves

Fourteen week-old calves were fed a two per cent level of "Aurofac" (aureomycin feeding supplement) in a simple grain ration of cottonseed meal and corn while on pasture. The animals gained approximately 35 per cent more than the control animals during the first six weeks of feeding the supplement. After twenty weeks of feeding, no differences were observed in the average daily gains of both groups. The animals receiving the antibiotic had a better physical appearance than the controls. This research shows no harmful effect in feeding older animals aureomycin.

—*L. L. Rusoff*

Effect of Antibiotics on Milk Production

Fifteen Holstein cows were divided into 3 groups of 5 animals each. Group I received the regular L. S. U. herd ration; group II, the same ration supplemented with a 1 per cent level of aureomycin feeding supplement ("Aurofac"); and group III, the same ration as fed group I supplemented with a 1 per cent level of a tyrothricin feeding supplement (2 gm. tyrothricin per lb.). The experiment was conducted for a 60-day period. Milk samples were collected for analyses at two-week intervals.

No apparent differences in milk production, fat percentage, or composition of the milk were observed among the groups of cows. The antibiotics did not show any detrimental effect on the

ruminating and lactating animals, and were not carried over into the milk. —*L. L. Rusoff, M. O. Haq* and A. J. Gelpi, Jr.*

Antibiotics Tyrothricin and Bacitracin Show No Advantage as Supplements to Calf Starter

Twenty-one purebred Holstein newborn calves were divided into three groups. Group I (control) received a 19.4 per cent digestible protein calf starter; group II, the same calf starter, supplemented with 2 per cent tyrothricin feeding supplement (2 gm. tyrothricin per lb. of supplement); and group III, the calf starter supplemented with 2 per cent bacitracin feeding supplement (5 gm. bacitracin per lb.). All calves were weaned from milk at 30 days of age, and were fed *ad libitum* the calf starter and medium quality clover hay beginning at 8 days of age.

The average daily gains for each group of calves at the end of 90 days were: I (control) 1.15 lb., II (tyrothricin) 1.22 lb., and III (bacitracin) 1.14 lb. The antibiotics fed did not appear to produce a growth stimulation in young calves, nor were any detrimental effects observed. —*L. L. Rusoff and A. V. Davis*

Antibiotic Aureomycin Stimulates Growth of Young Calves

An antibiotic (aureomycin) feeding supplement, "Aurofac," and crystalline aureomycin HCl were supplemented to a calf starter to determine what effect the antibiotic had on growth of calves through 16 weeks of age. Twenty-four purebred Jersey and Holstein newborn calves were divided into three groups. Group I (control) received a 19.4 per cent digestible protein calf starter containing no animal protein; group II, the calf starter supplemented with 2 per cent aureomycin feeding supplement (2.5 gm. aureomycin per lb. of supplement); and group III, the calf starter supplemented daily with 75-150 mg. of crystalline aureomycin, fed by capsule. All calves were weaned from milk at 30 days of age, and were fed *ad libitum* the calf starter and medium quality clover hay beginning at 8 days of age. The crystalline aureomycin feeding was begun at 8 days of age.

The results of this trial definitely indicate that the antibiotic, aureomycin, produces a growth stimulation in young calves. The Jersey calves receiving the aureomycin feeding supplement (2 per cent level in calf starter) and those receiving the crystalline aureomycin showed a gain of approximately 25 per cent over the Jersey control calves; the Holstein aureomycin groups showed a gain of approximately 15 per cent over the Holstein control group. The antibiotic supplementation also lowered the incidence of scours.

A bacteriological study of the effect of aureomycin on the

* Graduate student.

rumen micro-organisms of the calves failed to reveal any change in the usual microscopic appearance.

—*L. L. Rusoff, A. V. Davis, and J. A. Alfordo**

Effect of Feeding Vitamin B₁₂ to Lactating Cows and the Vitamin B₁₂ Content of the Milk

Since vitamin B₁₂ has been shown to have a growth-promoting activity, it is desirable to determine whether or not high levels of vitamin B₁₂ in the ration would influence the vitamin B₁₂ content of milk. Holstein cows were fed a 2, 3, and 4 per cent level of a vitamin B₁₂ feed supplement (12.5 mg. B₁₂ per lb.) in their grain ration over a period of 15 days. At the end of the experimental period, milk samples were collected and assayed for vitamin B₁₂ microbiologically. No differences in the vitamin B₁₂ content of the milk of the various groups of cows were found. Therefore, it appears that the vitamin B₁₂ content of cow's milk cannot be increased by feeding a vitamin B₁₂ supplement at a 4 per cent level in the grain ration. —*L. L. Rusoff and M. O. Haq†*

Skimmilk Feeding of Dairy Calves

The raising of dairy herd replacements is expensive, especially when young calves are fed whole milk. Skimmilk powder mixed with water (1 to 9) costs about one-third as much as whole milk. Twenty-four Jersey and Holstein calves of the University dairy farm were used in a study to determine the length of time calves should be fed skimmilk. Four calves of each breed were grouped as follows: Group I, skimmilk for four weeks; Group II, skimmilk for six weeks; and Group III, skimmilk for eight weeks. In addition to skimmilk they were fed regular herd ration, 16 per cent protein, and a poor quality legume hay. All calves received their dam's milk for the first 3 days and whole milk until the 14th day and gradually changed to skimmilk. Vitamin A supplement was added (shark liver oil) until the calves were 3 to 4 months of age. Records were kept on rate of growth and vigor of the calves until six months of age.

Average Daily Gain of Jersey and Holstein Calves in Each Group

Group	Jerseys		Holsteins	
	4 mo.	6 mo.	4 mo.	6 mo.
	lbs.	lbs.	lbs.	lbs.
I	.79	1.07	1.01	1.29
II	.77	.98	1.01	1.34
III	.85	.99	1.12	1.29

* Bacteriology Department

† Graduate Student

The calves fed skimmilk for eight weeks made slightly greater gains than did those fed skimmilk for a shorter period of time. However, there was no apparent difference between the various groups as to rate of growth and health at six months of age.

—*B. J. Burch, Jr., and J. B. Frye, Jr.*

Oxidized Flavor Development in Stored Frozen Cream

Studies on the delay or prevention of the development of oxidized flavor in stored frozen cream were conducted using as antioxidants, with and without added Cu, ethyl caffeate (obtained from green coffee), sustane (butylated hydroxyanisole), Tenox II (butylated hydroxyanisole with synergists, and Tenox BHA (without synergists). Samples containing 40 per cent pasteurized cream from milk produced in early summer and from milk produced in the fall were stored at -10° F. in 0.5 pt. standard glass milk bottles and in 0.5 pt. friction-top tinned cans. Results of the two trials indicated that the antioxidants were effective in preventing the development of oxidized flavor for at least 6 months or longer without the addition of Cu. In the presence of added Cu, however, ethyl caffeate at the 0.04 per cent level in summer cream was effective through 12 months but was ineffective in winter cream. None of the other antioxidants used was effective beyond 50 months of storage. Samples containing antioxidants stored in metal cans without added Cu failed to hold up for a 6-month period. —*A. J. Gelpi and L. L. Rusoff*

Entomology

Insecticide Tests for Control of Cotton Pests

Climatic control of the boll weevil during the latter part of the season in 1951 caused such a decline in population of this pest that critical evaluation of insecticides was not possible. Against these comparatively light infestations the following materials were equally effective for boll weevil control at the rates indicated in pounds of technical insecticide per acre per application: aldrin — 0.25, calcium arsenate — 8, dieldrin — 0.15, g BHC — 0.3, heptachlor—0.25, and toxaphene—2. It was necessary to add DDT at the rate of 0.5 pounds of the technical insecticide per acre per application to aldrin, dieldrin, BHC, and heptachlor for bollworm control. Under conditions of severe bollworm infestations, which developed in several sections of the state, toxaphene failed to give adequate control of this pest, making it necessary to add DDT to this material. Calcium arsenate in alternate applications with 3-5-40 mixture (3 per cent gamma benzene hexachloride, 5 per cent DDT, and 40 per cent sulphur) gave satisfactory control of bollworms. The 40 per cent sulphur in the above mixtures, when used in every application, gave satisfactory suppression of spider mites.

Heavy infestations of spider mites developed in several areas of the state particularly following applications of insecticides for control of thrips and overwintered boll weevils. Where mite infestations were well established, suppressive dosages of sulphur were not sufficient to give satisfactory control. Against well established infestations of spider mites the following materials were effective at the rates indicated in pounds of the technical insecticide per acre per application: Systox — 0.4, sulphur — 25, parathion — 0.1, aramite — 0.6, sulphenone — 1.5, and TEPP — $\frac{1}{2}$ pint of the 40 per cent concentrate. With the exception of Systox, it was necessary to make two or more applications at intervals of 4 or 5 days. Systox, which possesses systemic properties, gave excellent control with one application.

EPN, Compound 269, Compound 711 and PAWC are new materials which were tested in field plots for the first time. None of these materials were outstanding in control of the major cotton pests. EPN and compound 269 deserve additional testing. Results obtained with compound 711 and PAWC for control of the major cotton pests were so poor that further testing of these materials is not justified.

The effectiveness of sprays formulated from calcium arsenate, dry wettable concentrates of DDT, and BHC, and emulsifiable concentrates of DDT and BHC was compared for the second year. All materials gave about equal control of the boll weevil, but calcium arsenate failed to control bollworms satisfactorily. The effectiveness of sprays formulated from dry wettable concentrates and those formulated from emulsifiable concentrates is equal when applied at the same rate. Difficulties encountered in applying the former at low gallonage are such that further testing does not seem justified.

In small-plot tests dieldrin at the rate of 0.15 pound technical insecticide per acre per application at intervals of 5, 7 and 10 days between applications gave approximately equal control of the boll weevil. DDT was included in all applications at the rate of 0.5 pound per acre for control of bollworms. These results indicate the need of further testing of this insecticide to determine the possibilities of extending the interval between applications.

—*J. S. Roussel, L. D. Newsom, C. E. Smith, and J. C. Weber*

Infestation of Cotton by Rootknot Nematode

Infestation by rootknot nematode was studied in the following commercially important cotton varieties during 1951: Deltapine 15, Fox, Empire WR, Coker 100 WR, Stoneville 2-B, and Delfos 9169. Toward the end of the growing season plants were selected at random from replicated small-plot variety tests at Baton Rouge, Calhoun, and Curtis. These plants were pulled from the soil, care being taken to leave as many roots intact as possible. The roots were shaken free of soil and each plant was placed by visual inspection into one of the following four classes: 0 — no infestation; 1 — slight; 2 — moderate; and 3 — severe. A relative rootknot index based on the number of plants falling in each injury class was calculated for each variety. Such an index ranges from 0 denoting no infestation to 100 indicating severe infestation.

Results expressed as relative rootknot index are tabulated below.

Severity of rootknot infestation varied from location to location. Deltapine 15 was the most seriously infested and Delfos 9169 the least seriously infested of the six varieties studied. Test No. 2

Location	Empire WR	Deltapine 15	Fox	Coker 100 WR	Stoneville 2-B	Delfos 9169
Baton Rouge	89.7	97.9	91.6	91.2	95.0	79.2
Calhoun	21.7	20.0	21.2	13.8	13.5	7.8
Curtis Test 1	34.7	70.0	60.7	34.2	39.2	32.0
Curtis Test 2	37.7	66.7	55.3	47.0	40.0	30.0
Average all locations	45.9	63.6	57.2	46.5	46.9	37.2

at Curtis included 24 additional varieties. Of these Miller A, Paula 40, Coker 100 Staple, Louisiana 33, Pandora, Tidewater, and Wilds showed susceptibility comparable to that of Deltapine 15. Cobal, Delta Pride, EH 806, Hybird 564 M, and Plains were comparable to Delfos 9169 in susceptibility. —*L. D. Newsom and W. J. Martin*

The Tobacco Thrips as a Pest of Cotton

The heaviest infestation on record of cotton by the tobacco thrips occurred during 1951. Cotton seedlings were seriously damaged throughout the state. In spite of this early injury, the plants recovered and Louisiana produced one of its highest per acre yields in history.

The results of studies conducted during the past three years show that thrips infestations have consistently retarded the growth and development of seedling cotton plants. Thrips injury during the first six weeks after planting resulted in an average decrease of about 20 per cent in height of the main stem. At the same time, decreases in leaf area amounted to about 50 per cent. Injured plants make less growth, thereby slowing down cultivation processes and thus increasing costs. In addition, the injured plants may be more severely damaged by "soreshin" or "damping-off." Cotton on which thrips were controlled made a more vigor-



Cotton seedlings injured by thrips

ous, uniform early growth which resulted in a slight advance in the date of maturity of part of the crop.

Although the effect of thrips injury on the yield of cotton is negligible, the trend toward mechanization of the cotton crop places a premium on early uniform growth and early maturity. These advantages may be obtained at relatively low cost through thrips control. On the other hand it has been observed that heavy infestations of such pests as spider mites, cotton aphid, and bollworms often follow early application of insecticides. Such infestations often result in more damage to the crop than that which would have been caused by the pest for which the insecticide applications were made. —*L. D. Newsom and J. S. Roussel*

Seed Treatment for Control of Soil Insects

In earlier studies it was found that benzene hexachloride and chlordane used as soil insecticides effectively controlled three soil inhabiting insects which damage the stands and early development of corn, cotton, and beans. The insects were the sand wireworm, southern corn rootworm, and the seed-corn maggot. The chemicals were applied in admixtures with sand, old sawdust, or the fertilizer. Chlordane was effective against the wireworm when used at 1 to 2 pounds of the technical chemical per acre and BHC at dosages as low as 2 ounces gamma. Higher dosages were required to effectively control the rootworms and maggots.

Although these treatments were economical and practical, there still remained the job of mixing them with the fertilizer or some other kind of carrier before use. Also it was found that benzene hexachloride caused an off-flavor in many crops, thus limiting its use. Consequently the experiments in 1951 were designed to develop a satisfactory method of treating the seed with chlordane and a fungicide. After numerous attempts a satisfactory slurry was developed using methocel (methyl cellulose) as the carrying agent.

A formula was developed using 2 ounces of 50 per cent wettable chlordane and $1\frac{1}{2}$ ounces arasan suspended in one pint of 4 per cent methocel solution. This amount was adequate to treat one bushel of corn seed. Experimental plantings of both sweet and field corn treated with this slurry showed that the treatment was equal to the soil treatment in effectiveness.

By using the same amount of chlordane necessary to give control through soil treatment (2 pounds technical per acre) enough slurry can be prepared to treat 32 bushels of seed corn, or enough to plant 150 to 200 acres. This represents a tremendous saving in cost of material and labor, but with equally good con-



Top picture—Stand of sweet corn when seed were treated with chlordane-
 arasan-methocel slurry. Bottom picture—Stand of sweet corn when seed were
 not treated.

trol. Seed treatment of corn should be regarded as a form of insurance for a good stand.

The above named insects, especially the seed-corn maggot, are also destructive to snap beans. The chlordane-arasan-methocel slurry was found to be satisfactory in the control of these pests on snap and lima beans.

Cotton Seed Treatment—A slurry prepared by using $\frac{3}{4}$ pound of 50 per cent wettable chlordane in 1 quart water was used to treat acid-delinted cotton seed. This slurry was used at the rate of 1 quart per 100 pounds of seed. This dosage gave an excellent coverage of the seed and complete protection to the seedling cotton from sand wireworm damage. Untreated plots in the same field were 100 per cent destroyed in the seedling stage. Also undelinted cotton seed was treated with 50 per cent wettable chlordane powder at the rate of 1 pound per 100 pounds seed with excellent results.

No detrimental effect has been observed on corn (sweet and field types), snap and lima beans, or cotton seed as a result of these seed treatments. Neither has any difficulty been experienced with the proper operation of planters when treated seed is used.

—*E. H. Floyd and C. E. Smith*

Sugar Cane Insects

Sugar Cane Borer

The sugar cane borer infestation in the early spring of 1951 was at an extremely low level in contrast to the abnormally heavy infestation the previous year. The severe winter weather reduced the overwintering population to the significantly low figure of an average of only 4 live borers per acre compared with 2,892 and 2,737 in 1949 and 1950. No commercial control of either the first or second generation was necessary, although there was a build-up of borers after the middle of August which accounted for a fairly heavy injury in some areas. However, the annual borer injury survey revealed that there was an average of only 6.8 per cent of the joints bored throughout the cane belt.

Insecticidal Studies—Various new and promising insecticides were tested against the second generation of borers in comparison with undiluted cryolite and 40 per cent ryania, the two recommended materials. Of the newer materials, Compound 711 was the only one which compared favorably with cryolite, which was less effective than ryania as is usually the case against this generation. Compound 269, EPN, and Rothane exhibited a fairly good initial control but, similar to many other insecticides of a like nature, caused an increase in borer infestation by harvesttime. Systox and Pestox showed no effectiveness at any time.

Undiluted cryolite and 40 per cent ryania remain as the only two insecticides recommended for the control of the borer. Over a period of years cryolite has been found to be slightly more effective than ryania against the first generation and ryania definitely more effective against the second generation.

Reduced concentrations of ryania of 15 and 30 per cent with different activators were as effective as cryolite and slightly less effective than 40 per cent ryania without the activators for control of second generation borers, showing considerably more possibilities than in the previous year.

Wireworms and Various Soil Animals

In 17 tests conducted to date in different type soils to determine the benefits derived from soil applications of toxaphene, chlordane, DDT, benzene hexachloride, parathion, and aldrin in

controlling the sugar cane weevil and various soil animals such as springtails, bristletails, earwigs, centipedes, and millipedes, no significant gains in stand of cane or yield of cane or sugar resulted. No benefits were derived from two tests in the wireworm area, probably because of the lack of a destructive infestation. In some of the tests, the increase in borer infestation resulting from the destruction of natural enemies by the soil chemicals was sufficient to seriously affect yields. This condition was more pronounced in the chlordane-treated plots. Several tests in which some of the other soil chemicals are being used are in progress.

Insect Vectors of Mosaic and the Yellow Sugar Cane Aphid

A study of the seasonal abundance, habits and control of the four species of aphids that carry sugar cane mosaic disease was initiated in 1951. Work was concentrated on the rusty plum aphid and the greenbug or spring grain aphid. The corn leaf aphid and the sedge aphid are the other two species responsible for the spread of the disease. Although the yellow sugar cane aphid is not associated with mosaic it sometimes becomes a problem following extensive second generation dusting, especially with cryolite.

In studying the occurrence of the rusty plum aphid throughout the year, it was found that there is a general increase in population in June and July and then a fluctuation thereafter depending upon the degree of parasitism. The abundance of the yellow sugar cane aphid is nearly the same except that this species is affected by predators, there being no parasites.

Systox, Pestox and Metacide were found to be very effective against all species of these aphids, and remain effective for at least a month. In two experiments, all three materials almost completely destroyed an extremely heavy population of rusty plum aphids and yellow sugar cane aphids. In two tests, no significant reduction in amount of mosaic in variety Co. 290 was obtained from applications of Systox and Pestox, although aphids were effectively controlled. Applications were probably started too late. —A. L. Dugas, E. J. Concienne and Charles Sanders

Taste Contamination in Some Food Crops Caused by Some of the Organic Insecticides

Soon after benzene hexachloride came into general experimental use after World War II, it became known that certain crops treated with it acquired musty off-flavored tastes. Later it was determined that foods so affected did not necessarily have the BHC taste while in the raw stage, but the off-flavor was brought out in cooking. When the flavor of a vegetable or fruit becomes contaminated with BHC, the product is often completely unpalatable.

table and unusable. Since this insecticide proved so effective in the control of soil insects and many other species affecting truck crops, a potential serious problem faced the vegetable growing industry.

The first crop in Louisiana that was found to be affected in flavor with BHC was tomatoes. The off-flavor was detectable only in the processed product. Since that discovery and the report of off-flavor in white potatoes in other parts of the country, a number of tests and observations have been made in an effort to determine the crops affected in flavor by BHC and some other organic insecticides.

The determination of flavor contamination for most of these crops was made by Miss Rita Belle Attaya of the Department of Horticulture of the Louisiana Agricultural Experiment Station.

The following table gives the crops affected or unaffected by BHC, Lindane or chlordane as observed in Louisiana.

TABLE 1. Flavor Contamination of Certain Fruits and Vegetables by Insecticides

Crop	Treatment	Flavor affected	Description
Figs	Regular BHC — 3% gamma dust on tree	Yes	Detectable only in processed product — off-flavor mild
Onions	Regular BHC in soil from previous season	Yes	Slightly detectable in raw stage — very foul taste in cooked stage
Onions	Regular BHC dusted on growing plant	No	
Field peas	Regular BHC in soil or dusted on growing plant	Yes	Detectable in cooked stage — a musty flavor
Field peas	1% Lindane dusted on growing plant	No	
Sweet corn	Regular BHC dust applied to growing ears	Yes	Detectable only in cooked stage — foul taste
Irish potatoes	Regular BHC and Lindane applied as soil treatment	Yes	Taste very foul in regular BHC — less foul in Lindane
Irish potatoes	Chlordane — 5 lbs. technical per acre as soil treatment	No	
Peanuts	Regular BHC as soil treatment	Yes	Detectable in raw and cooked product — very foul taste
Cabbage, Cauliflower, Rutabaga	Lindane as soil treatment	No	
Tomato	Regular BHC dusted on growing plant	Yes	Detectable only in processed product — musty taste
Turnips	Regular BHC dusted on growing plant	Yes	Musty taste
Cucumber	1% Lindane dust applied to growing crop	Yes	Not noticeable in raw stage — slight off-flavor when pickled

—E. H. Floyd and C. E. Smith

Chlordane Protects Sweet Potatoes from Damage by Soil Insects

Previous studies (Annual Report 1949-50) using chlordane as a soil treatment have shown that this insecticide thus used is partially effective in protecting sweet potatoes from infestation by the sweet potato weevil. This study was continued in 1951, but because of light weevil infestation information regarding this phase of the study was negligible. However, severe infestations of miscellaneous soil inhabiting insect species were present in the field, and at harvest the amount of damage done by this group was determined. Mole crickets, white grubs, wireworms and perhaps flea-beetle larvae were responsible for the greater part of the damage. Injury to the potato by the white grub is evidenced by an irregular area eaten from the surface. The wireworms damage potatoes by drilling $\frac{1}{2}$ inch or more into them, leaving a small round hole.

Chlordane was used at 5, 2, and 1 pounds technical material per acre as a soil treatment. It was applied as a mixture in the fertilizer. An average of 8 per cent of the potatoes from chlordane treated plots showed damage by these miscellaneous soil insects. Untreated plots contained an average of 36 per cent damaged potatoes. —*E. H. Floyd and C. E. Smith*

Control of Thrips and Diseases of Onions

The research begun in 1950 with DDT emulsion sprays to control onion thrips on onions was enlarged in 1951 to include DDT wettable powder sprays with and without fungicides to control downy mildew along with thrips. Fungicides included in this test were Dithane Z-78 and copo-zinc.

The real problem in onion thrips control is not one of finding a toxic agent that will kill the thrips, but of finding a wetting agent that will thoroughly wet the onion blade, particularly in the early stage of growth. This property of wetting is even more important in the use of a fungicide to control the diseases. Practically all the wetting agents in common use were tried on onions using small spray equipment but without satisfactory success. Many of these wetting agents, regardless of concentration used, had practically no effect on wetting the onion plant. A deposit of the insecticide and fungicide on the leaves was impossible, since they merely ran off the plant as quickly as the spray was applied.

After a number of combinations a 50-50 mixture of two proprietary spreaders and emulsifiers was made which did adequately wet the onion plant and was compatible with the insecticides and fungicides used.



Onion thrips control. Sprayed on right, not sprayed on left.

A total of 10 applications was made at weekly intervals with a knapsack sprayer. The thrips population in 1951 failed to develop to damaging numbers until after the bulbs were nearly mature (see photograph). The mildew disease did not develop. There was a light infection, but it was not enough to affect development of the crop. The following table summarizes the results of this test.

Treatment *	Seasonal average thrips per plant	Yield dried onions per acre	Increase over check
0.5% DDT emulsion	0.5	4436 lbs.	524 lbs.
50% DDT wettable powder —			
3 lbs. per 100 gal.	4	4842	930
Dithane — 3 lbs. per 100 gal.	85	4417	505
Copo-zinc — 3 lbs. per 100 gal.	99	3738	—174
3 lbs. 50% DDT wettable powder			
and 3 lbs. Dithane Z-78 per 100 gal.	3	5075	1163
3 lbs. 50% DDT wettable powder and			
3 lbs. Copo-zinc per 100 gal.	4	4665	753
0.5% DDT emulsion and 3 lbs.			
Copo-zinc per 100 gal.	0.1	3642	—270
3 lbs. Copo-zinc per 100 gal. plus			
0.5 DDT every other application	0.5	3757	—155
Check	98	3912	—

* The wetting agent was used in all treatments.

The above figures show the superiority of DDT wettable powder spray containing Dithane Z-78 over all of the other combinations used. They also indicate that copper and oil are detrimental to onions.

Additional work needs to be done to determine the efficiency of this insecticide-fungicide spray combination under more severe insect and disease conditions. Also the wetting agent developed for this work should be further investigated in comparison with the standards available and its possible adaptation to other agricultural spray uses. —*E. H. Floyd, E. C. Tims, and C. E. Smith*

Chlordane Shows Promise as a Simple Control Measure for Termites in Buildings

Since 1950 three properties in Louisiana have been experimentally treated with wettable chlordane powder for control of the subterranean termite. Each building treated contained a serious infestation, and each presented its specific physical problems. One building was a church (wood), the second a general store (brick and wood), and the third a brick dwelling. The source of infestation in the church was around the baptistry where the soil remained damp continuously. One pound of technical chlordane from 50 per cent concentrate was applied in a two-inch deep trench encircling the outline of the baptistry at the ground line. Examinations of active tunnels and feeding areas inside the building almost daily for two weeks revealed the gradual decline of termites until the end of the two-week period, when no specimens could be found any place on the property. This treatment was made in June, 1950. To date the property is still free of infestation.

The second property (brick store built close to ground and enclosed) was treated by removing floor boards near outside walls and spraying the ground with 50 per cent wettable chlordane at the rate of one pound per three gallons of water. A total of four pounds technical chlordane was used in this treatment. The building was approximately 30 feet by 40 feet. Examination one month later revealed no fresh signs of termites in the store except in the walls of a large ice box. The area under this box was not sprayed in the original application. Flooring was removed to permit entrance of a hose nozzle, and approximately one pound technical chlordane was applied as a water spray to the soil beneath and surrounding the ice box. Examination a month later revealed no fresh signs of the insect.

The third property (brick dwelling) was treated the same as described for the store above except the application was made from underneath the building. A total of 1½ pounds technical

chlordane was used. This property was treated in the early fall of 1951 and re-infestation to date (February 1952) has not occurred.

Based on the above information it appears that chlordane may answer the need for a simple and economical remedy for termites which can be applied by the homeowner himself.

—E. H. Floyd

Magnolia Leaf Miner

Infestations of a leaf miner on magnolia (*Magnolia grandiflora* and *M. virginiana*) have increased both in severity and area affected in Louisiana in recent years. Although the damage is very conspicuous and appears serious at the time it is being done, the trees appear to recover and the injury is hardly discernible by the end of the growing season. Studies conducted to date show the following:

The adult insect is a small jet black weevil (*Prionomerus calceatus*) which is about 1/8 inch long. The larva or grub mines the host leaves, working in groups ranging up to a dozen or more. There is only one brood or generation per year. In 1951 the adults started appearing on the host trees about April 25; the eggs,



Magnolia shoot showing injury caused by the larva of *Prionomerus calceatus*. (Note the two youngest leaves of shoot on right which were destroyed by new generation adults.)

which are inserted into the midrib of leaves that average about half grown, started hatching about May 1; larvae started pupating about May 7; first new adult was observed May 13. Adults of the new generation were very abundant from about May 20 to 27, but nearly all of them had left host by June 1. The young weevils feed for about a week on the young immature leaves, often destroying them, before aestivating.

In laboratory toxicity studies, dieldrin and chlordane were very effective in killing the adult weevil. Lindane, toxaphene, and DDT were less effective, with their effectiveness in the order named. —*C. E. Smith and J. C. Weber*

Yield of Fall Field Peas Increased Through Use of DDT Dust

A field of fall field peas was used in an experiment to determine whether or not DDT dust was effective in controlling the cowpea curculio and stink bugs. These insects are largely responsible for the failure of field peas in the late summer and fall in Louisiana.

Ten per cent DDT dust was applied to the plots beginning when the pods were approximately one-fourth mature. One-half of the plots received a second application one week later. The dust was applied at the rate of 15 pounds per acre.

Plots dusted once produced 1,938 pounds of clean green pods per acre, plots receiving 2 applications of the dust produced 2,283 pounds, and the untreated plots produced 1,560 pounds.

The study of the use of DDT or some other suitable insecticide on fall-grown field peas should be further investigated.

—*E. H. Floyd and P. L. Hawthorne*

Ornamental Entomology

During the past year small plantings of azaleas, camellias, and roses were made for use in studies of their insect pests. The phytotoxicity of the various insecticides to several varieties of camellias and roses will be included as a part of this program.

A study of the seasonal history, abundance, and development of the tea scale (*Fiorinia theae* (Green)) was started and is continuing. All stages of the scale from egg to adult were found weekly at Baton Rouge since the beginning of this study in April 1951. A particularly large percentage of the total population of the scale was in the crawler stage during the months of April, June, August, and September.

Preliminary tests of insecticides for control of a spider mite on azalea are now in progress. —*J. S. Roussel and J. A. Lanier, II*

Feed and Fertilizer Laboratory

Activities of the Laboratory

Major activities of the laboratory consisted of analyses of 1,799 samples of feeds, 1,069 samples of fertilizers, and 291 samples of agricultural poisons. These were official samples obtained by the inspectors of the State Department of Agriculture in connection with the regulatory program. Although fewer samples of feeds and fertilizers were received than usual, the number of agricultural poisons was more than doubled. Major portion of agricultural poisons received was cotton insecticides. In general the manufacturers of feeds, fertilizers, and agricultural poisons are doing a good job in maintaining the quality of their products.

Three hundred twenty-one samples of miscellaneous materials of agricultural interest were analyzed for farmers, county agents, and other departments of the Experiment Station.

As a result of the cooperative agreement with the Louisiana State Racing Commission, 854 specimens of urines and salivas were analyzed for presence of "dope." No positive specimens were found.

It has long been known that the customary analyses for protein, fat, and fibre do not necessarily represent the quality of the feed. This is particularly true in cases of poultry feeds, where quality of protein and vitamin content are highly significant. A cooperative study with the Poultry Department was initiated to evaluate poultry feeds. Seventeen different brands of poultry feeds purchased on the open market were fed to chickens. The test was duplicated. Results indicated that there is considerable difference in the quality of poultry feeds and that some feeds would be unprofitable for the average feeder to use. Work along these lines will be continued with the objective of taking such action as may be necessary to encourage certain manufacturers to improve the quality of their feeds.

Various members of the laboratory personnel participated in check sample analyses with the objective of maintaining and increasing the accuracy of analytical work. The laboratory participated in a collaborative study with several insecticide manufacturers as a means of checking and improving the accuracy of analyses of insecticides containing benzene hexachloride.

—*E. A. Epps*

Forestry

A Study of the Production and Durability of Various Tree Species When Used Untreated as Fence Posts on Louisiana Farms

The School of Forestry's Fence Post Farm now contains a total of 745 posts representing 30 different tree species or specific types of posts. Practically all of these are used on Louisiana farms. New series set during the past year include red mulberry, longleaf pine, loblolly pine, "fat" or lighterwood pine, white oak, hickory, bluebeech or ironwood, southern red oak, sweetgum, blackgum, chinquapin, used crossties, post oak, loblolly pine, "peeled," sweetgum "peeled," and used split crossties. Each series is represented by 25 replicate posts.

The second annual inspection was made during the past fall. Each post was tested for serviceability by means of a moderately strong push at the top. If it did not withstand this strain it was tallied as a failure and examined at the breakage point to determine cause of failure. The following table summarizes the results of this inspection.

TABLE I. Results of 1951 Annual Inspection

Species	Number failures	Number in service	Service life failed posts — years —	Cause of failure
Sassafras	1	24	1½	Sapwood decay; small post
Longleaf pine	2	23	½	Decay; small posts
Loblolly pine	1	24	½	Decay; very small post
Honeylocust	2	23	1½	Sapwood decay; small post
Cherrybark oak	2	23	1½	Decay; small posts
Pecan	1	23	1½	Decay
Sweetgum	5	20	1½	Decay and insect borers
Cottonwood	7	18	1½	Decay and insect borers
Black willow	5	20	1½	Decay
Loblolly pine—"peeled"	4	21	½	Decay
Sweetgum - "peeled"	4	21	½	Decay

The failures in sassafras, honeylocust, and cherrybark oak were not anticipated since it is known that heartwood of these species is at least moderately durable. In each case however the failure occurred in a small post which had insufficient heartwood to withstand the applied strain.

The comparatively large number of failures in sweetgum, cottonwood, and black willow is considered normal. These posts have been in service 1½ years (or two growing seasons) and decay progresses rapidly in these species.

Perhaps the most outstanding results of this inspection were the failures in both peeled loblolly pine and peeled sweetgum posts. These were set April 20, 1951, and have seen one-half year's service. Four posts in each series failed, whereas none of the unpeeled sweetgum and only one unpeeled loblolly pine set at the same time failed. These preliminary results indicate that a peeled post will not last as long as one with the bark left on, contrary to what might be expected.

During 1952 it is planned to set 100 additional posts on the Southeast Louisiana Experiment Station near Franklinton. These will be replicate series of white oak, red mulberry, redb cedar, and baldcypress, and will be set in ordinary line fences. They will be subject to the use and abuse common to any post under actual use conditions, and will also encounter different soils and drainage conditions than found on the Post Farm. It is hoped that these four additional series will provide comparative data and indicate the variation in service life that may be expected under different conditions of soils, drainage, and use. —*Martin B. Applequist*

Experimental and Demonstrational Tree Planting in Washington Parish

During the year 1951 the plantation area involved in this project was not increased. Because of poor survival of the previous year's planting however it was necessary to replant certain areas. For that reason about 5,000 longleaf seedlings and over 1,000 slash pine seedlings, all grown in the L.S.U. Nursery at

Summary of Plantation Survey — June, 1951

Species	Date Planted	Survival - % -	Height - inches -	Injuries - % -		Number of rows checked
				Cronartium	Tipmoth	
Slash	Jan. 1950 Replanted Jan. 1951	95.0	19.9	0-1		11
Longleaf	Jan. 1950 Replanted Jan. 1951	45.3	Grass Stage	0	0	22
Loblolly	Jan. 1949	89.0	30.8	5-10 (Approx.)	96.1	42
Slash	Jan. 1949	70.5	37.7	12 (Approx.)	1-2	44

Baton Rouge, were outplanted in February, 1951. The above longleaf pine seedlings were of Tangipahoa Parish seed origin while the slash seedlings were grown from purchased seed and were probably of Georgia seed origin. Owing to a combination of factors much of this planting was done by young inexperienced colored boys, and the quality of this planting job suffered somewhat.

On June 7, 1951, forestry students attending summer camp made a rather complete check on survival and growth on the entire plantation. The table on Page 84 summarizes the findings.

Conclusions—Based on the development and growth of this plantation up to June, 1951 the following conclusions are warranted:

1. Cattle will browse on, pull up, and damage pine seedlings particularly during the late winter when native forage is scarce.

2. Longleaf pine seedlings are subject to heavy mortality during the first year for reasons as yet unknown. Drought, silting over of the terminal bud, and brown spot infection are possible causes.

3. Loblolly pine seedlings have exhibited good initial survival and growth but are subject to very heavy pine tip moth infection. This has resulted in a bushy growth habit and a reduced height growth. Loblolly pine is also subject to moderate infection by the cronartium rust.

4. Slash pine has survived well and made the best growth of any species planted but has the greatest amount of cronartium infection. This eventually may reduce the apparent advantage it has at this time.

—*Martin B. Applequist*

Home Economics

Human Nutrition

During the past year the nutritional status surveys begun in 1947 have been concluded and the data have been coded, tabulated, and analyzed. The following studies have been completed.

Nutritional Status of Preadolescent Boys and Girls in Selected Areas of Louisiana

The nutritional status study of 552 preadolescent elementary school children, aged 8 through 11 years, was completed in December, 1951. The means of assessing nutritional status, which were described in the 1949-1950 annual report, included; (1) height and weight measurements, (2) 7-day food intake records, (3) determinations of serum levels of ascorbic acid, vitamin A, carotene and (4) hemoglobin concentrations, and (5) clinical examinations for signs and symptoms associated with vitamin deficiencies.

These children were located in seven schools in five different parishes. All records, that is, physical, dietary, clinical and four biochemical measures, were completed for 487 of the 552 children. The number in each of the age groups was as follows: 8 year olds, 110; 9 year olds, 123; 10 year olds, 132; and 11 year olds, 122 subjects. Two hundred and forty-six of the subjects were boys and 241 girls.

A comparison of heights and weights of the subjects to Baldwin-Wood standards showed 70 per cent of the children to be of normal height and 63 per cent to be within plus or minus 10 per cent of the normal weight. When compared to Meredith's Height-Standards for boys 8 to 11 years, only 53 per cent of the boys were of normal height; the other 47 per cent were shorter. The Boynton standards for girls of this age were the same as Baldwin-Wood standards. According to these, 66 per cent of the girls were of average height and 18 per cent were shorter.

The individual records of food intake were calculated for calories, grams of fat and carbohydrates and each of 9 nutrients—protein, calcium, phosphorus, iron, vitamin A value, thiamin, riboflavin, niacin and ascorbic acid. A comparison was made, for each age group studied, between the caloric intake and the recommended intakes of the National Research Council. The levels of intake for each of the nine nutrients were classified as to (1) 100 per cent or above, (2) 67 to 99 per cent, and (3) below 67 per

cent of the National Research Council's recommended allowances. Over 60 per cent of the children had dietaries containing 100 per cent of recommended amounts of the nutrients except ascorbic acid. Fifty-three per cent had the recommended amount of ascorbic acid. With the exception of ascorbic acid, less than 9 per cent of the children had diets classified below 67 per cent of the suggested levels. Twenty-two per cent received less than two-thirds of the recommended amounts for ascorbic acid. The dietaries of the individual subjects were further analyzed to determine the average servings per week of the basic foods. In addition, the kinds and amounts of cereals, sweets and fats eaten were tabulated.

The mean intake with standard deviation and range for calories and each of the nine nutrients was determined. The ranges were very wide, the standard deviations of the means for calories, vitamin A value and ascorbic acid were large. The means were above the allowances of the National Research Council for all nutrients. They were: calories, 2401; protein, 89.9 gm.; calcium, 1.20 gm.; phosphorus, 1.53 gm.; iron, 11.96 mg.; vitamin A, 6181 I.U.; thiamin, 1.27 mg.; riboflavin, 2.23 mg.; niacin, 14.59 mg.; and ascorbic acid, 80 mg.

The mean blood values for hemoglobin (12.8 gms.), vitamin A (37.8 mcg.), carotene (124.4 mcg.) and ascorbic acid (.80 mg.) were all found to be above the amounts that have been designated as satisfactory or normal. The mean serum value for ascorbic acid was 0.80 mgs. in spite of the fact 46 per cent of the subjects had intakes which were less than two-thirds of the recommended allowance of the National Research Council. This can be explained by the fact that the children from one school were receiving quantities of citrus fruit juices at school; their intakes were very high and consequently their blood serum levels.

Correlation coefficients were determined between the following: (1) caloric intake and percentage weight deviation; (2) hemoglobin and protein intake; (3) hemoglobin and iron intake; (4) vitamin A value intake and serum vitamin A levels; (5) vitamin A value intake and serum carotene levels; (6) blood vitamin

TABLE I. Correlation summary

Factors Correlated		Corr. Coeff.	"T"
Caloric Intake	% Weight Deviation	.1723	3.74*
Protein Intake	Blood Hemoglobin	.0290	—
Iron Intake	Blood Hemoglobin	.6370	18.26*
Vitamin A Intake	Blood Vitamin A	.7742	27.06*
Vitamin A Intake	Blood Carotene	.1368	3.30*
Blood Vitamin A	Blood Ascorbic Acid	.2522	9.24*
Ascorbic Acid Intake	Blood Ascorbic Acid	.4454	11.00*

* Significant at .01 level.

A (intake) and serum ascorbic acid levels; (7) ascorbic acid intake and serum ascorbic acid levels. The results are summarized in Table I.

The relationships for all the above with the exception of hemoglobin to protein were found to be statistically significant at the .01 level.

The results of the clinical examination showed 60 per cent of the subjects exhibited no manifestation of nutritional deficiencies with the exception of carious teeth. Fifty-five per cent of the children had dental caries, the number varying from one to ten. With the exception of poor posture, which may or may not be due to faulty nutrition, the most prevalent manifestations were changes of tissues of the lips, mouth and tongue. The symptoms noted most often were papillary hypertrophy in 40 per cent, cheilosis in 32 per cent and red tip and sides of the tongue in 28 per cent of the subjects.

Skeletal changes indicating a past history of rickets were present in 30 per cent of the subjects but other than for winged scapula, less than 20 per cent of the group showed marked changes.

To study the associations between the prevalence of clinical signs and symptoms often associated with a specific nutritional deficiency and the intake of the nutrient and the individual's serum level of the nutrient, correlation coefficients were determined for each and all combinations of symptoms with intake and serum levels. Statistically significant associations were found between:

- (1) bluish-red mottling and both vitamin A and carotene blood levels;
- (2) angular lesions and scars and both protein and riboflavin intakes, but not with niacin intake;
- (3) papillary hypertrophy or atrophy with protein intake, but not with riboflavin and niacin intakes;
- (4) angular lesions and scars, cheilosis, papillary changes, magenta tongue, seborrhea and folliculosis and riboflavin intake.

—*Dorothy S. Moschette, Kathryn Causey, Echo Cheely,
Margaret Dallyn, Ruth Martin Patrick, and Laureame
McBryde*

A Study of the Ascorbic Acid Nutrition of a Selected Group of Louisiana Children

A study was made of the ascorbic acid nutriture of 447 Louisiana children, aged 8 through 11 years. The ascorbic acid intake and serum content were determined, and the gum condition noted. Statistical methods were applied to determine whether or not any

significant association existed between the factors affecting vitamin C nutriture.

Approximately one-half of the serum values were at or above 0.6 milligrams per 100 ml. and three-fifths of the subjects were receiving at least 60 milligrams of ascorbic acid daily. About 61 per cent of the 8 and 9 year-olds and 44 per cent of the 10 and 11 year-olds were receiving the daily allowance of ascorbic acid recommended by the National Research Council. Fifty-one per cent of the 8 and 9 year-olds and 47 per cent of the 10 and 11 year-olds had serum ascorbic acid levels at or above 0.6 milligrams per 100 ml.

Statistically significant association was found between ascorbic acid intake and blood content and between serum levels and gum changes characteristic of hypovitaminosis C. Linear correlation between ascorbic acid intake and blood content ceased at intakes above 110 milligrams and serum levels at and above 1.1 milligrams per 100 ml.

—*Dorothy S. Moschette and Margaret Haworth Dallyn*

Weekly Variations of Hemoglobin Concentration, Blood Serum Ascorbic Acid, Vitamin A and Carotene Levels of Preadolescent Children

This study was made to determine whether biochemical measurements from two blood samplings are sufficiently more reliable than single determinations to warrant the extra time and cost involved.

Replicate blood samples at one-week intervals were obtained from 351 children and were analyzed for hemoglobin, ascorbic acid, vitamin A and carotene. Mean blood levels of hemoglobin and of carotene at intervals of one week were identical, 12.8 gm/100 ml and 130 mcg/100 ml, respectively. Mean blood levels of ascorbic acid and of vitamin A for the two dates were in agreement, as the mean values of ascorbic acid were 0.8 and 0.9 mg/100 ml and of vitamin A, 38.3 and 39.0 mcg/100 ml.

The mean values gave no indication of individual variability found. Seventy per cent of the hemoglobin replicates differed less than 1.0 gm/100 ml, 41 per cent of the ascorbic acid replicates varied less than 0.2 mg/100 ml, 34 per cent of the vitamin A replicates varied less than 5 mcg/100 ml, and 38 per cent of the carotene replicates showed a difference of less than 10 mcg/100 ml blood serum.

An analysis of variance showed that although the differences among children were significant, the differences between dates were not. The coefficient of variation was 6.5 per cent for hemoglobin, 39.1 per cent for ascorbic acid, 23.4 per cent for vitamin

A, and 17.4 per cent for carotene, which was considered high for vitamin A and excessive for ascorbic acid determinations.

The high individual variability found in ascorbic acid blood values and the fairly high variability in vitamin A replicates might make questionable the correlation of blood values of individuals with clinical findings and dietary intakes.

The use of biochemical measurements of the blood in assessing nutritional status of populations, however, in accordance with results found in this study, shows that one sampling from a child would serve the purpose as well as two, as the means with standard deviations were the same for the two samplings for all four nutrients studied.

A point in favor of analyzing replicate blood samples may be made in that the least significant difference could not be determined from a single sampling. In future studies, however, where only one sample is obtained, the results reported here might be applicable, as the analysis of replicates requires more time with fewer cases which is a disadvantage in surveying populations.

—*Dorothy S. Moschette and Echo Price Cheely*

Dietary Studies of Louisiana Elementary School Children

The dietary studies of Louisiana children begun in 1947 have been completed. This final report covers a study of the food intake of 1,222 preadolescent children from 19 schools in 12 parishes.

The adequacy of intake of food was evaluated in terms of the number of servings per week of the food groups as recommended by the Nutrition Board of the National Research Council. The purpose of this study did not include a calculation of specific nutrients of the foods eaten.

Table I shows the percentage of children whose diets met or exceeded the recommended allowance of the N.R.C. for each of ten groups of foods; those who had from 57 to 99 per cent, and those who had less than 57 per cent of the recommended allowances.

Over 75 per cent of the children had good intakes of milk, meat and whole grain or enriched bread and cereals. Forty-four per cent of the subjects had a good intake of yellow and green vegetables, yet the average of six servings per child per week which the children consumed was only one less than the total of seven servings recommended for each child per week.

The outstanding faults of the diets were low intakes of butter or margarine, eggs, and sources of ascorbic acid, that is, citrus fruits and tomatoes.

In addition to evaluating the diet records in terms of adequacy they were further analyzed to study the consumption of candies, concentrated sweets and carbonated beverages. The weekly consumption of these was found to be high.

The results of the study on dietary habits of this selected group of children gave indications of dietary trends and the percentage of children whose dietaries were adequate, borderline, or inadequate in each of the major food groups.

—*Laureame McBryde and Dorothy S. Moschette*

TABLE 1. Per cent of 1,222 Louisiana children whose dietaries contained 100, 99 to 57, or less than 57 per cent of the basic food groups as recommended by the National Research Council

% of N.R.C. Allowance	Green & yellow vegetables	Tomatoes & citrus fruits	Other vegetables & fruits	Potatoes	Milk	Meat, fish & poultry	Eggs	Dry beans, peas, nuts & cheese	Whole grain & enriched bread & cereals	Butter or margarine
100% or above	44	39	69	18	76	81	37	21	88	16
99% to 57%	29	27	21	38	17	16	28	27	10	27
57% or less	28	34	10	44	7	3	35	52	3	57

Horticultural Research

Pole Bean Variety Yield Tests

Canfreezer and Green Savage were grown in replicated plantings in the spring and fall in comparison with Kentucky Wonder, McCaslan, #6 x Kentucky Wonder, and F.M. 191. The average yields for spring and fall in bushels per acre were as follows: Green Savage, 131.9; Canfreezer, 125.5; #6 x Kentucky Wonder, 116.9; Kentucky Wonder, 108.3; McCaslan, 87.9; and F.M. 191, 55.7.

Canfreezer and Green Savage were entered in the Southern Regional Trials in 1950 and 1951. During both years Canfreezer and Green Savage were rated as first and second, respectively.

Bush Bean Variety Yield Test

Thirty varieties and breeding lines were planted in cooperation with the U. S. Vegetable Breeding Laboratory. The yields in bushels per acre were as follows: Wade, 270.6; Contender, 265.0; Topcrop, 253.7; Tendergreen, 132.5; and Stringless Black Valentine, 103.3.

Contender is a fresh market bean and is the earliest of the above-mentioned varieties. Wade was released January 1, 1952, by the U. S. Department of Agriculture. It is later than Contender but is especially desirable for the home garden, shipping, and freezing.

Of the breeding lines tested, several showed definite promise.

—*James F. Fontenot and Julian C. Miller*

Lima Bean Variety Trial

The varietal trial consisted of two standard varieties, a white selection of a speckled variety (White Crowder), and three seedlings developed at the Louisiana Agricultural Experiment Station.

The harvest season consisted of 13 pickings and was continuous from June 15 to November 5, at which time the vines were damaged by frost. The Willow Leaf variety started bearing later than the others and was susceptible to rust. L-1-1 seedling reached its peak performance later than Carolina Sieva but had a tendency to yield more uniformly over the harvest period. Seedling L-49 and Carolina Sieva produced the highest yield, as shown in Table I.

TABLE I. Yield, per cent dry weight, percentage protein, and amount of ascorbic acid of lima bean varieties

Variety	Total yield (lbs. per acre)	% dry weight	% protein	Ascorbic acid mgs./100 gms. fresh weight
Willow Leaf	10,783	37.15	24.94	21.47
Carolina Sieva	16,614	33.56	25.50	16.59
White Crowder	15,595	35.25	24.19	24.68
L-49	16,638	33.50	27.13	24.07
L-39	15,566	32.45	27.44	27.23
L-1-1	14,934	36.32	24.88	24.89

Willow Leaf had the highest percentage dry weight but is relatively low in protein. L-39 was highest in protein and ascorbic acid but lowest in dry weight. L-1-1 had the highest weight of shelled beans and less weight of pods, signifying that it contains the highest amount of edible material.

—*Julian C. Miller and John C. Noonan*

Breeding of Brassica Crops and Variety Trials

Cabbage—Many crosses and selections have been made to obtain a medium size, short core, round headed cabbage with high quality. Several lines are being increased for further selection. Severe cold and dry weather made it impossible to obtain accurate yield data in the variety trials; however, the Glory of Enkhuizen, Copenhagen Market, and Round Dutch varieties appeared to perform the best.

Cauliflower—Thirteen varieties and strains of cauliflower were tested. Snowball A and Snowdrift were the best varieties in the early maturing group. In the medium-early group, Snowball M and Stella Nova were superior. Snowball Y performed the best in the late maturing varieties.

Broccoli—Fifteen commercial varieties of broccoli were grown in a yield trial. Texas 107 performed best under Louisiana conditions. It produced a compact, uniform head of dark green color. The side sprouts were abundant and of good quality. The De Cicco variety also produced good yields.

—*John J. Mikell, Julian C. Miller, and James F. Fontenot*

Sweet Corn Varieties

The Southern Regional Sweet Corn Cooperative trials were conducted again this year. This test consisted of 16 varieties planted in replicated trial and 30 varieties planted for observation and notes. Golden Security, an early variety, Aristogold Ban-

tam Evergreen, Sweetangold, and KVF 50-35, three mid-season varieties, rated highest in yields, ear size, husk coverage, freeness from ear worm damage, kernel color, and taste.

Tests on frozen samples cooked after thawing indicated that the above four varieties ranked excellent as to color, flavor, general appearance, and general acceptability.

—*P. L. Hawthorne and Rita Belle Attaya*

Onion Breeding in Louisiana

In the onion breeding program for Louisiana, emphasis has been placed upon improving the Creole onion variety by breeding for mildew resistance, higher content of soluble solids, higher yields and uniformity with hybrids, thrips resistance, and selection of non-bolting and non-splitting strains. By means of a genetic "tester," lines of Red Creole are being isolated which are known to be true breeding for red color, and which will never produce white or yellow segregates.

Soluble solids in the Creole variety over a four-year period have averaged 16.04 per cent. Fluctuation in solids occurs from season to season, but since 1946 the general trend in content of soluble solids has been upward. The yearly averages were 13.57 in 1946, 14.68 in 1949, 16.74 in 1950, and 16.18 in 1951.

No other variety of onion which we have tested averages as high in soluble solids as the Creole. Representative varieties are shown below:

<i>Variety</i>	<i>Average Per cent Soluble Solids</i>
Italian Red	4.9
Yellow Bermuda	5.6
Excel	6.7
Early Yellow Globe	7.4
Crystal White Wax	7.6
White Grano	8.2
Australian Brown	9.7
152 Lines of Inbred Red Creoles	13.5
Four-year average Red Creole	16.0

There is a direct correlation between the soluble solids and good storage qualities. For this reason the Creole is one of the best varieties for storage and dehydration. Recent studies have shown that the soluble solids in the Creole onion increase from the outside to the inside and from the top to bottom of the bulb.

Studies have been initiated to develop a technique of soluble solids determination by the specific gravity method, which is much faster than present methods. Preliminary results indicate a very

high correlation between solids and specific gravity readings ($R = .884$).

Since 1950 about 313 new hybrids and foreign introductions of onions have been obtained or developed and are being grown to test their yielding ability for disease resistance. For the first time certified seed of C5 Red Creole was increased in California. A total of 350 pounds of seed was obtained this past season. Such seed increase ensures a supply of high quality seed to onion growers in years when there is a crop failure in Louisiana. Yield trials at Baton Rouge and Breaux Bridge have shown no significant difference in performance between Louisiana-grown and California-grown seed, although seed grown at Chase in 1950 germinated and grew with more vigor than seed grown in California or in other areas of Louisiana. Five pollination cages are being constructed to mass superior lines of Creole to produce a "synthetic" variety. In addition an experiment is being set up to test the combining-ability of certain male-sterile lines already developed with the C5 Red Creole. —*August E. Kehr and E. C. Tims*

Okra Investigations

Louisiana Green Velvet and Louisiana Market are the recommended varieties for table use. The first mentioned variety has a long, round, green, rather slender pod, while the Louisiana Market has a short, green pod. Both are suitable for fresh market, canning, and freezing.

Crosses and selections have been made to obtain lines of okra which have a high oil content. From this breeding practice, the percentage of oil has been gradually increased. Table 2 shows some selections with their oil content.

TABLE II. Percentage of oil in certain variety selections and seedlings of okra

Variety or seedling	% oil
Gold Coast #1	15.45
Gold Coast #2	16.20
Gold Coast #3	17.45
Louisiana Market-11	15.55
Louisiana Green Velvet-12	18.64
Louisiana Green Velvet-17	16.64
Thibodaux #1 x Gold Coast #3	17.13

—*Julian C. Miller*

Sweet Potato Investigations

The work on sweet potatoes for the past year includes that conducted at Baton Rouge, Chase, and at nine other locations in the state. Studies concerning specific gravity, sugar content, stor-

age and effect of physical treatments on the sugar content of sweet potatoes have been added to the program. Seedling L-241 was officially named Goldrush during the past year.

Foundation Stock Seed—Over 300 bushels of reselected Unit I and 230 bushels of Goldrush (L-241) were grown at the Sweet Potato Farm at Chase, La. This material was distributed throughout Louisiana. Promising seedlings were increased for further study and yield trials.

Breeding—Because of unfavorable weather conditions, only 2,570 true seed were produced this year. Under such conditions, seedlings 8-31, 130, and 201 were the best parents when used either as the male or female parent.

Approximately 25,000 first year seedlings were grown at Chase, La., and from these 236 were selected for further testing. This material was selected on the basis of skin and flesh color and potential yielding ability. The most promising 1950 seedlings are 0-4, 0-25, 0-47, 0-156, 0-160, 0-161, and 0-175.

Yield Trials—Yield data on the standard varieties and some promising seedlings are recorded in Table 3. Heartogold and L-240 produced the highest average yields at all locations in Louisiana. Unit I Porto Rico and Goldrush (L-241) produced approximately the same. Texas Bunch and Allgold proved inferior in yielding ability under Louisiana conditions.

In an early test conducted at Arnaudville, L-240 produced 129.5 bushels of number ones per acre as compared to 41.0 bushels for Unit I Porto Rico. This seedling has become very popular in this area as an early sweet potato, and its acreage will be increased as much as the seed supply will allow. L-240 should be grown only for early potatoes. If allowed to grow the normal 120 days, which is required for Unit I Porto Rico, it will produce jumbos and many over-sized potatoes.

Analytical Studies—Analyses for dry weight, total pigment and total sugars were run on approximately 235 1951 seedlings. Eleven of them had more than 30 per cent dry matter, four of which had white flesh. One hundred and seven of the seedlings contained more than 50 mgs. of total pigment per 100 gram dry sample. Generally, the per cent dry matter was low and the pigment content was high.

Samples of four varieties and selections—Unit I, Heartogold, Goldrush, and L-240—grown at seven localities in the state were analyzed for dry weight, carotene, ascorbic acid, and total sugars. Results showed that the per cent dry matter was consistently higher for all the varieties grown at Baton Rouge than those grown at the other locations, while those grown at Sunset, Scott,

TABLE III. Combined data of some promising seedlings and standard varieties of sweet potatoes grown at different locations in 1951

Marketable Sweet Potatoes — Bushels per Acre (55 pounds per bushel)																		
Variety or seedling	Skin color	Sprout plants per bushel (55 pounds)	Baton Rouge	Lafayette	Sunset	Grand Prairie	Scott	Church Point	Oak Grove	St. Francisville	Franklinton	Fruit & Truck Exp. Sta., Hammond	Sweet Potato Farm, Chase	Disease reading		Per cent dry matter	Carotene mg./100 g dry weight	Cooking test
														Will	Soil rot			
Unit I																		
Porto Rico	Cu	1987	270.0	371.3	193.6	158.6	197.0	146.8	156.0	127.4	135.3	236.8	62.9	VS	VS	30.56	5.00	1
Goldrush	Cu	2666	217.0	294.8	204.2	201.3	269.3	223.0	155.2	131.2	127.2	144.1	73.5	R	S	26.24	12.02	1
Heartogold	Flesh	2363	245.0	365.2	165.1	249.2	253.4	213.6	—	150.2	189.4	295.6	60.9	VS	MS	26.71	7.27	1
L-240	Cu	1704	245.0	278.9	60.5	165.3	215.8	214.2	297.0	201.2	105.4	334.0	103.0	VS	VS	29.75	6.34	2
Texas Bunch	Cu	—	108.0	—	106.3	—	—	117.1	—	—	—	—	96.4	VS	VS	31.44	6.15	1
Allgold	Cu	—	134.0	238.7	—	—	—	117.7	102.2	—	—	—	93.8	S	VS	25.56	12.04	3

VS - very susceptible
 S - susceptible
 MS - moderately susceptible
 R - resistant

1 - excellent
 2 - good
 3 - fair
 4 - poor

and Lafayette were low in that same quality. There was no significant difference in the ascorbic acid and sugar content as to location, but rather to differences among varieties. Those samples from Church Point were highest in carotene content, with no difference among the other locations. As an individual variety, it was shown that Goldrush has approximately twice as much carotene as any other variety grown at any location.

Sugar Content of Sweet Potatoes—The purposes of this study are (1) to obtain information on genetical and environmental influences in relation to sugar content and (2) the buildup of high-sugar lines for use in the breeding program.

The sugar content of approximately 250 individual seedling selections, made in 1951, has been determined. A range from about 3 to 9 per cent fresh weight basis was obtained, clearly illustrating the variability of this character and thus offering considerable promise in the matter of breeding and selection for high content lines.

Effect of Physical Treatments on the Sugar Content of Sweet Potatoes—It was desired to obtain as sweet a product as possible for use in chip making. The following factors were studied: (1) variety of potato, (2) storage conditions, (3) preheating treatments, (4) short term chilling, and (5) enzyme baths and washes.

Variety was found to be more important in the appearance of the chip than in the sugar content. Proper storage and preheating were shown to be essential steps in the preparation of a high quality product. Storage conditions can be selected to provide a sugar range in the raw potato up to about 10 per cent. Preheating at 160° F. for 30 minutes will approximately double the original content. Since the chips lose 50 per cent of their weight in cooking, it is possible to produce chips containing up to 35 to 40 per cent sugar.

Preheating also improves the color and appearance of the chip and reduces the amount of cooking oil retained by it.

It has been found that sweet potatoes can be stored the year around in air-conditioned rooms at 60° F. The roots remain sound and in good marketable condition with a minimum of shrinkage.

Disease Studies—WILT: The increasing occurrence of Fusarium wilt in Louisiana has created an urgent need for desirable resistant varieties. For the past several years, emphasis has been placed on using resistant parent or parents in the breeding nursery. In 1950 ten cuttings from each of 467 seedlings were tested for their reaction to Fusarium wilt. This work was conducted in the greenhouse. Many of the same seedlings were planted in an infested field at Calhoun, La. The results from these experimental

tests show that, in general, the amount of resistance transmitted progresses with the use of more resistant parents; and that susceptible lines carry factors for resistance, thus indicating that resistance is probably due to multiple factors.

Additional wilt studies were made in southwest Louisiana. On a plot where wilt had caused serious losses in past years, Goldrush was planted along with Unit I Porto Rico. No wilt was found in Goldrush, whereas many Unit I Porto Rico plants were infected with wilt.

SOIL ROT: Soil rot is a serious disease in some areas in Louisiana, and since 1951 was a dry season, the disease was more severe.

A field known to be heavily infested with the soil rot organism was used to test four varieties and twenty promising seedlings for their resistance or susceptibility to the disease. Unit I Porto Rico and Ranger are very susceptible. Goldrush is susceptible and Heartogold is moderately susceptible. Seedlings L-224 and 9-33 appear to be resistant.

—*Julian C. Miller, T. P. Hernandez,
J. J. Mikell, James F. Fontenot, Rita Belle Attaya,
S. L. Dallyn, John C. Taylor, and W. F. Wilson, Jr.*

Irish Potato Investigations

Breeding—During the fall of 1950 approximately 10,000 seedlings were grown in the greenhouse at Baton Rouge. Selections were made at harvest time, primarily on the basis of color and shape, selecting seedlings either with dark red color or with smooth, solid white skin. The selected seedlings were divided into two lots. One lot was sent to Clark, South Dakota, and the other to Crossville, Tennessee, for production and further selection. After the seedlings are grown at these two locations, they are re-selected at harvest time. Samples are set aside for increase in these areas, for yield trials in Louisiana, and for making dry weight determinations.

Efforts are being made to breed varieties which are resistant to scab and late blight diseases, as well as for quality and high yields. The most promising red seedlings are LD 82-266, LD 82-257, and LD 82-269. The best white seedlings are LD 81-99 and LD 81-64. All of these seedlings are being increased for further trials.

Yields—Advanced yield tests were conducted at six locations in the state (Table 4). LaSoda and DeSoto performed better than the others in the trials at all locations. Both have red skin. The DeSoto appears to be better adapted to the sandier type of soil,

while the LaSoda appears to be more adapted to the medium and heavier soil types.

TABLE 4: Effect of location on yields of varieties in Louisiana

	Average - Bushels per Acre						
	Diamond	Hammond	Baton Rouge	New Roads	Calhoun	Chase	
	Planting Dates*						
	1/26/51	2/8/51	2/12/51	2/21/51	2/24/51	3/20/51	3/21/51
LaSoda	276.3	262.7	127.1	203.8	251.0	137.0	129.1
Triumph	190.3	176.7	84.5	79.0	111.0	58.2	48.1
DeSoto	267.3	249.2	73.4	204.9	243.0	82.3	73.3
Kennebec	258.2	203.9	72.4	200.3	191.0	84.0	94.3
73-10	226.5	240.0	64.8	115.0	—	—	—
LD 82-265	—	—	55.4	78.0	99.0	34.2	84.3
LD 82-22	—	—	—	66.4	165.0	50.9	76.0

*Plantings harvested 90 days after planting date.

Four 40-foot replications

Use of Sprout Inhibitors—Several combinations of various inhibitors applied in different carriers and at different strengths have been used on potatoes stored at 40, 50, and 60 degrees Fahrenheit. Recently the inhibitors have been added to the wax used in waxing the potatoes. Satisfactory sprout control has been obtained with several treatments. One gram of methyl ester of naphthaleneacetic acid per bushel, applied in a dust carrier, has given best results to date. Data on the wax methods are not extensive enough as yet to reach a conclusion. —*Julian C. Miller, Raymon E. Webb, John C. Noonan, and S. L. Dallyn*

Strawberries

During the last two years the number of progeny seedlings grown is more than double that of any corresponding period in the history of the strawberry breeding program in Louisiana. All seedlings received the leaf spot and scorch suspension spray as in the past. Of the seedlings tested during previous years, L-7-42 has shown promise of developing into a variety for north Louisiana. Plants of it are being increased.

Analyses for soluble solids were run on 125 seedlings and varieties in 1951. Of this number 45 seedlings analyzed 10 per cent soluble solids or higher, and 9 ran 12 per cent or higher in soluble solids. Analyses were run three times during the season on 16 varieties and selections for total and soluble solids, ascorbic acid, and reducing sugars. Of the varieties tested Konvoy was

highest in ascorbic acid and reducing sugars and Klonmore was highest in solids. Seedling L-7-42 was consistently higher in all qualities than the other seedlings. This seedling ranked above Konvoy in ascorbic acid and reducing sugars.

Seven varieties and selections of strawberries were prepared for freezing. Both sliced and whole berries were kept at -5°F. for eight months and then judged for appearance and flavor.

Sliced berries of Klondyke, Konvoy, and L-27 were ranked highest in that order for flavor and appearance. Of those frozen whole 117-1-45-3, Klondyke, and L-27 placed first, second and third, respectively. Generally, the sliced berries were preferred to those frozen whole. However, 117-1-45-3 frozen whole was considered the best of all varieties and preparations.

Strawberries of seven varieties and selections were preserved and subjected to four storage temperatures. The varieties used were Klondyke, Klonmore, Konvoy, and Marion Bell and the selections were 117-1-45-3, L-27, and 7-42. Samples were placed at -5°F. , 32°F. , 40°F. , and in common storage. All samples were kept in a dark place during the storage period. The preserves were compared with a color standard immediately after having been prepared and after seven months' storage.

Table 5 shows the results of the comparison of the samples with the standard. Klondyke, L-27, and 7-42 showed the greatest color intensity immediately after they were prepared. These varieties retained the bright red color throughout the 40 degree storage period but faded in common storage. In general all varieties stored at 32°F. and -5°F. retained their color better than at the other two storage temperatures. The fruit stored at common storage was an "off" brownish color and had changed to a dull brown color, so that it was difficult to compare them with the standard color solutions.

TABLE 5. Color comparison of varieties and selections of strawberries stored under different conditions

Variety	Original index	Storage for 7 months at			
		Common	40°F.	32°F.	-5°F.
Klondyke	10	4	11—	11	12
Klonmore	7	5	5	7	7
Konvoy	9	4	7	10	10
Marion Bell	5	5	5	6	8
117-1-45 3	9	6	7	10	9
L-27	11	5	9	10	11
7-42	10	8	9	10	—

12 indicates greatest color intensity

4 indicates least color intensity

—P. L. Hawthorne, Julian C. Miller, W. F. Wilson, Jr.,
Rita Belle Attaya, and N. L. Horn

Shallot Breeding and Improvement

The breeding program for shallots is directed almost entirely toward developing resistance to mildew, pink root and yellow dwarf. Genetic stocks now growing at Baton Rouge include 131 fertile Nebuka-shallot amphidiploids, 27 lines selected from seedlings grown from true seed prior to 1951, 8 varieties of shallots gathered in Louisiana, 14 introductions, and 86 lines of unselected seedling plants. Seedlings numbers 7 and 8 have shown great promise and are being increased for further testing and possible ultimate release to farmers in the state. Studies have been initiated to learn the effects of hot water treatment on disease eradication in shallot and garlic sets.

Results shown in Table 6 indicate that thrips may cause severe loss of weight of sets in storage. Sets damaged by thrips lose more moisture in storage than those dusted with DDT. The four lots of seed were placed in storage on July 2 and removed on October 9. All were badly infested with thrips when put in storage.

TABLE 6. Effect of DDT treatment on loss of weight of shallots in storage

	Total Weight in Grams		Loss in	
	When put in storage	After storage	Grams	Per cent
Breaux Bridge seed				
Lot 1 - not treated	790	482	308	38.98
treated with DDT	805	602	203	25.21
Lot 2 - not treated	1589	987	602	37.88
treated with DDT	1051	737	314	29.87
Moreauville seed				
- not treated	1695	1144	551	32.50
treated with DDT	1544	1069	475	30.76
L.S.U. seed				
- not treated	692	348	344	49.71
treated with DDT	681	443	238	34.94
Average loss treated lots				30.19
Average loss untreated lots				39.77

—August E. Kehr and E. C. Tims

Tomato Breeding and Variety Trials

Fifteen varieties and two hybrids were tested for yield and adaptability to Louisiana conditions. In the spring trial, Jefferson, Southland, Lakeland, and Rutgers varieties produced the highest total yield. Stokescross No. 5, a hybrid, performed well but is later than the above-listed varieties.

Thirteen lines were tested for resistance to Fusarium wilt. Several showed considerable promise. All lines were saved for further testing.

Breeding for resistance to fruit cracking has been added to the program. Crosses were made between a non-cracking, undesirable type and commercial varieties. Many selections have been made for further trials.

In cooperation with the U. S. Regional Vegetable Breeding Laboratory, additional tomato trials have been conducted with emphasis placed on disease resistance, yield, quality, and adaptability to Louisiana conditions. —*John J. Mikell and E. C. Tims*

Ornamentals

Native Iris Investigations—Interest in the native iris is considerable and is increasing. Only a limited amount of work is being done with this plant at present. A variety planting of some of the better varieties and selected seedlings has been grown for two years on Lintonia silt loam in a well-drained location. Excellent growth and increase of plants have been obtained. Some seedling plants obtained from controlled crosses and open-pollinated seed have been grown. By planting seed in the fall, growing the seedlings in the greenhouse over the winter and setting them in cold frames in early spring, many plants produced blooms in less than a year from seed. This makes possible an early selection of promising seedlings. Breeding is contemplated to obtain further information concerning species of native iris.

Narcissi Investigations—In general the type of narcissi that are often called daffodils is not very successful in south Louisiana. This is especially true for the so-called long trumpet varieties. A variety test of 75 varieties of various types was planted in October, 1949. Most of the bulbs were imported from Holland but some were obtained from the North Carolina Coastal Plain Branch Station. Five hundred bulbs each of two varieties, King Alfred and Beersheba, were planted for storage studies. Most of the varieties bloomed well the first season, with exceptionally good flowers being produced in some instances. When the bulbs were dug in the summer, many bulbs were lost due to rots. Basal rot was probably the cause of most of the loss of bulbs. Good bulbs were kept and planted the following October. Blooms of many varieties were not as good the second year as they were the first year of the trial. Many very good blooms were produced, however. The varieties that have been most promising so far are King Alfred, Mrs. E. H. Krelage, Gertie Miller, Fortune, Carlton, Lucienne, Thalia, and Golden Sceptre.

Of the 500 bulbs of the Beersheba variety planted for storage studies, not one bloom was obtained the first season and there were not enough good bulbs for the storage studies. The King Alfred bulbs produced excellent blooms and good bulbs. After digging, different lots of bulbs were kept at storage temperatures of 35, 40, and 60 degrees Fahrenheit and in common storage. Other lots were not dug but were to be left in place for two and three years. Blooms produced from bulbs that had been stored at 40°F. produced very early blooms with very short stems and weak foliage. Blooms from other storage lots of bulbs were not so apparently abnormal. The bulbs kept better at 35 and 40°F. than they did at 60°F. Bulbs left in the ground produced excellent blooms, many of them because they had not been separated.

—*W. D. Kimbrough, R. H. Hanchey, and Wayne Jones*

Vegetable Seed Increase Work

New varieties of vegetables bred by the Louisiana Agriculture Experiment Station are important in the state's agriculture as a result of the program of assisting farmers in increasing seed and plants of these varieties. During the year assistance was given seed and plant growers in production and selling of 1,842,900 pounds of improved seed, 20,150,000 plants, and 10,875 bushels of seed potatoes and Easter lilies. These were produced by 61 Louisiana growers under the horticulturist's supervision.

The following table presents a summary of seed and plants produced and sold under inspection in 1951:

ITEM	QUANTITY
Collards (Louisiana Sweet)	3,500 lbs.
Okra (Green Velvet)	35,000 lbs.
Okra (Louisiana Market)	800 lbs.
Onion (C-5 Creole)	3,000 lbs.
Shallots (Louisiana Pearl)	1,000,000 lbs.
Strawberry Plants (Konvoy, Klonmore, Klondyke, Marion Bell)	150,000 plants
Sweet Potatoes (Unit 1, Foundation Stock)	450 Bu.
Sweet Potatoes (Heart-O-Gold and Goldrush)	375 Bu.
Sweet Potatoes (Unit 1, Goldrush, General Certification)	10,000 Bu.
Sweet Potato Plants	20,000,000 plants
Peas (Calhoun Crowder)	1,000 lbs.
Pumpkin (Longfellow)	400 lbs.
Easter Lilies (Foundation Stock)	50 Bu.

—*Joseph Montelaro*

Plant Pathology

Nematocide Tests in Cotton Soils Infested with Nematodes and the Wilt Fungus

Five field experiments were made to study the effectiveness of nematocide treatments in cotton soils for controlling root knot and Fusarium wilt. Nematocides containing 40 per cent ethylene dibromide, or a mixture of dichloropropylene and dichloropropane were used. The tests were made on four different sites in the Red River Valley area and on one site at Baton Rouge. The soils were moderately to heavily infested with root-knot nematodes and slightly to heavily infested with the wilt fungus. Deltapine 15 cotton was planted. Root-knot ratings and wilt ratings were made toward the end of the season.

On the basis of root-knot ratings, nematocidal action was good in only two of the tests and poor in three tests. Poor nematocidal action in three tests possibly was due to insufficiently decomposed cover crops at the time of application of the nematocides. In the three tests where nematocidal action was poor there were little or no differences between treated and untreated plots in root-knot indices and in wilt indices. In the tests where nematocidal action was good, however, there was a definite correlation between the root-knot index and the wilt index in the treated compared to the untreated plots. Both root-knot indices and wilt indices were significantly lower in the treated plots.

—*W. J. Martin and L. D. Newsom*

Chemical Weed Control in Cotton

A large number of chemicals have been tested during the last four years for their weed-killing properties in cotton fields. Five new chemicals were tested and compared with the recommended practices as pre-emergence herbicides in 1951. Two of these have shown promise in experimental tests.

Chemicals other than herbicidal oils have not previously been used as post-emergence sprays. Seven chemicals were tested in 1951 as post-emergence directed sprays in cotton and were compared to herbicidal oils. Three of these showed promise as post-emergence directed sprays.

Studies in 1951 indicated that injury sometimes caused by post-emergence herbicidal oils is determined by the timing of ap-



Plot in foreground showing chemical weed control in cotton. Dinitro used as pre-emergence spray and oils used as post-emergence directed spray. Untreated plot in background.

plications in relation to stage of growth of the cotton rather than by the volumes of the various applications.

—*Wilbert Normand, L. E. Creasy, and E. R. Stamper*

Studies on White Tip of Rice

White tip, a disease of rice observed for many years in Louisiana by growers and research workers, has been shown to be caused by a nematode. A method was developed for rearing large numbers of the nematode in the laboratory. Such cultures of the nematodes were used in inoculation studies on rice grown in large greenhouse pots and in small field plots. The use of laboratory cultures as inoculum resulted in typical white tip symptoms in such known susceptible varieties as Early Prolific, Blue Rose, and Zenith. Bluebonnet, a known resistant variety, showed no white tip. Similar control plants not inoculated remained free of white tip through the use of seed treated with hot water and precautions designed to prevent contamination of the resulting plants. Basic information and techniques are now available for accurately determining the resistance of new varieties prior to release, or eliminating susceptible plants in breeding material.

The nematodes causing white tip are seed borne. Infested seed are believed to be the most important, if not the only, means by which the nematodes live from one rice crop to another. The nematodes cling to the inside surfaces of the hull in a resting condition and some may live for a period of about 24 months. In

various tests the nematodes within the seed have been killed by a number of different treatments. However, many of the treatments, such as methyl bromide, reduced germination as well as the vigor of seedlings. Hot water was the most effective treatment evaluated from the standpoint of complete nematode kill and lack of seed injury. Since practical difficulties are involved with the hot water treatment, the method probably can be used only for increase plots of foundation or certified seed rice. Since the cause and nature of the white tip disease are now known, practical control measures based upon resistant varieties or seed treatment can be expected. —*E. H. Todd and J. G. Atkins, Jr.*

Sugar Cane Breeding

From 1948 through 1951 a total of 79,000 sugar cane seedlings from crosses made at Canal Point have been planted at the Louisiana Agricultural Experiment Station at Baton Rouge. At the present time there are approximately 1,000 varieties from these 79,000 plants, which are in various stages of selection.

Also 550 selections from the U. S. Department of Agriculture, Houma, La., and the Louisiana Agricultural Experiment Station, Baton Rouge, are being tried in the Western part of the sugar area, at Columbia Plantation, Franklin, La., to determine if they are adapted to that area.

Two C.P. numbers were assigned in the fall of 1951.

—*P. H. Dunckelman, R. J. Steib, P. J. Mills, and S. J. P. Chilton*

Seed Treatment of Sugar Cane

Experiments on the effect of treatments of sugar cane seed pieces before planting with fungicides were continued for the fifth year. Results were comparable in the 1950-51 season to those in past years, the fungicides Puratized Agricultural Spray and Tersan giving significant increases both in stands and yields. New fungicides showing promise were Vancide 51 and two others with the numbers 4660 and 275d. Preliminary field-scale tests indicate costs with Puratized Agricultural Spray to be between \$2.00 and \$3.00 an acre. —*P. J. Mills, R. J. Steib, and S. J. P. Chilton*

The Production of True Seed of Sugar Cane in Louisiana

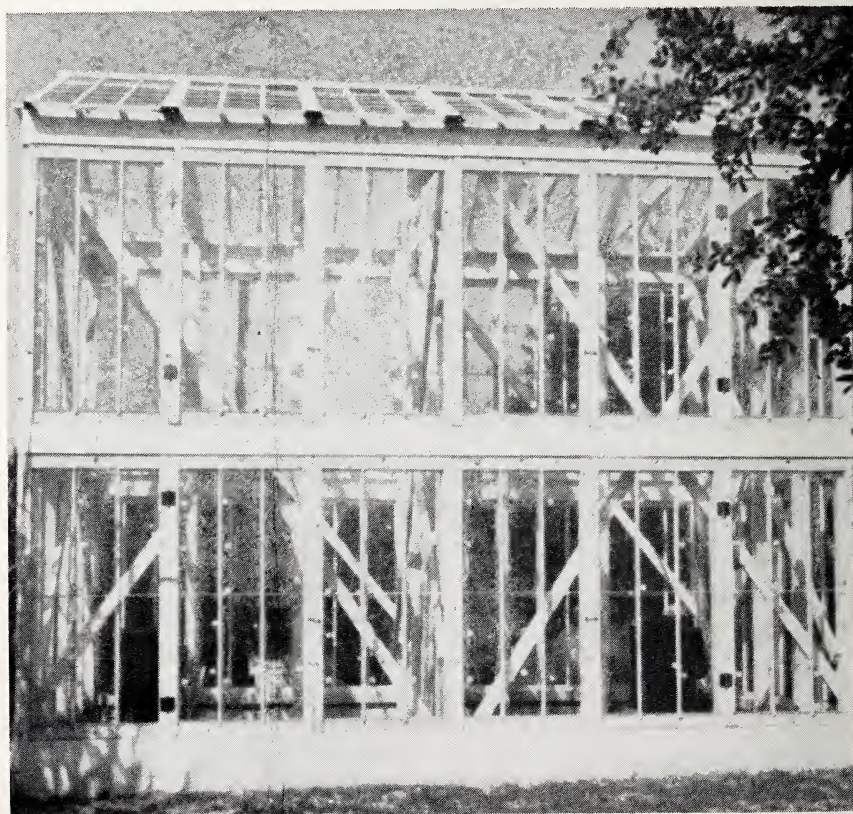
Up to the present all varieties of sugar cane in Louisiana have come from true seed produced in other areas, primarily Canal Point, Florida.

To determine if true seed of sugar cane could be produced in Louisiana, 25 varieties were planted at Grand Isle, La., in the fall

of 1948. In 1949, 18 of these varieties flowered, but temperatures were too low for pollen production. In 1950 a small greenhouse was built and canes were marcotted and brought into the greenhouse to determine if they would flower and produce viable pollen and seed. Two varieties produced flowers and 75 sugar cane seedlings were produced.

In 1951 another small greenhouse was built, and in October and November 400 plants of a number of varieties were marcotted and brought into the greenhouse. In February, over a hundred flowers from the major varieties used for breeding canes were produced, and more were in the process of flowering. Viable pollen was produced and it is expected that a considerable number of seedlings will be produced, as the first few heads have given over 5,000 seedlings.

—*E. Paliatseas, P. H. Duncelman, R. J. Steib, and S. J. P. Chilton*



Greenhouse at Grand Isle, La., used for producing true seed of sugar cane



Marcotting sugar cane at Grand Isle, La. Stovepipes are filled with soil and when stalks produce roots, the canes are cut below pipes and moved into greenhouse.

An Organic Fungicide with Eradicant Action Against *Ceratostomella Fimbriata*

The need for a fungicide that would eradicate the black rot fungus from contaminated sweet potato washing machines prompted the testing of various chemicals for that purpose. Such a fungicide should kill the fungus rapidly, leave no harmful residue on the machine, and have no harmful effect on the sweet potatoes. Results of laboratory tests indicated that two chemicals, Vancide 51 and Clorox, might be suitable for use on washing machines. Vancide 51 is a water solution of the sodium salts of dimethyl dithiocarbamic acid and 2, mercaptobenzothiazole with 30 per cent active ingredient. To test these two materials under commercial conditions experiments were made using an artificially-contaminated washing machine. Out of the lot of potatoes washed in the contaminated machine, 625 potatoes developed 4,832 black rot lesions. After treating the machine with a 2 per cent solution of Vancide 51, the 526 potatoes had only 162 spots, indicating about 97 per cent control of the disease by this treatment. In a

similar experiment, 228 potatoes had 1,677 black rot spots after washing in the contaminated washing machine. After treating the machine with 10 per cent Clorox, 189 potatoes had only 49 spots, giving 97 per cent control of black rot. However, some chemical burn was noted on potatoes washed in the machine treated with Clorox.

Of the two fungicides, Vancide 51 seems to be the more promising for use in controlling the spread of black rot by eradicating the fungus from contaminated machines. Also this material possibly could be used as a dip or spray for treating contaminated crates and as a spray for treating sweet potato storage houses.

—George D. Feazell and W. J. Martin

Internal Cork of Sweet Potatoes

Internal cork has increased considerably since its introduction in sweet potato plantings in the infested area in St. Landry Parish. Certain fields showed as much as 16 per cent of the potatoes with a trace to moderate cork at harvest in 1951.

Results of field transmission studies carried out during the 1950 growing season showed that the disease is transmitted from diseased to healthy plants under field conditions. Although transmission to the healthy potatoes, planted in rows adjacent to diseased potatoes, was relatively little, this was anticipated because of the low level of cork in the plantings at that time. With the present higher level of cork, transmission under field conditions can be expected to increase.

These results indicate that it is very important that growers eliminate all their diseased seed stock when they obtain cork-free seed stock. —W. J. Martin and George D. Feazell

Breeding for Disease Resistance in Onions and Shallots

The selecting and testing of the Calred-Creole hybrids for resistance to downy mildew has been continued. Because the spring of 1951 was not favorable for mildew development in the field the onions were sprayed with water at irregular intervals in order to produce an artificial epiphytotic of the disease. The susceptible seed stalks collapsed during the growing season while the resistant ones were unaffected.

During the 1950-51 seasons 14 F_2 populations totaling some 5,142 plants were observed for foliage resistance. From 2.8 to 24.2 per cent of the plants in the different lots showed a moderate degree of resistance. The degree of seed stalk infection was recorded for 11 F_2 populations. Segregation appeared to fit a 15:1

ratio in six populations and a 3:1 ratio in four lots, with susceptibility dominant.

The study of disease-resistant shallot hybrids is being continued. The original shallot-Nebuka hybrids proved to be disease resistant but most of them were too large and coarse for commercial use. A series of backcrosses were made in 1950 from the shallot-Nebuka amphidiploids to the common shallot in an effort to get the more desirable shallot characters into the progenies.

Some 33 lots of these backcrosses were tested in the field in 1951. The plants were exposed to yellow dwarf by interplanting diseased common shallots among the progenies. All the new seedlings were grown in a pink root infested plot which had been used for several years. Most of them divided rather slowly and in general had more of the characters of the Nebuka parent than those of the shallot. Many bunches remained green until July and never did form bulbs. Others matured slowly but did form some sort of bulbs.

None of the plants in any of the lots showed evidence of yellow dwarf. Conditions were not favorable for determining the effect of pink root on the growth of the shallot backcrosses in the field. However, all the plants were examined for pink root infection and records were kept to indicate the relative degree of resistance to the disease. Some lots showed a high degree of pink root resistance while others were quite susceptible. A number of the best looking progenies were kept for further testing and observations.

Miscellaneous Studies on Onion

Inheritance of Soluble Solids

Three lots of onions were grown from seed for use in the tests to determine the inheritance of soluble solids. They were as follows: (1) Calred, (2) Creole and (3) F_2 Calred-Creole hybrids. The bulbs were cured and stored for several weeks at 35°F. Samples of juice were extracted by means of a hydraulic press and soluble solids determinations were made with a refractometer. Dry weight determinations were made of about 10 per cent of each population.

The Creole parent is very pungent and high in soluble solids. The bulbs showed from 15.8 to 16.3 per cent soluble solids, while comparable Calred bulbs contained 5.4 to 6.6 per cent soluble solids as determined by the refractometer. The F_2 hybrids showed varying percentages of soluble solids from about 5 to 13 per cent. The frequency distribution of per cent soluble solids in each F_2 lot was normal and unimodal, indicating quantitative inheritance

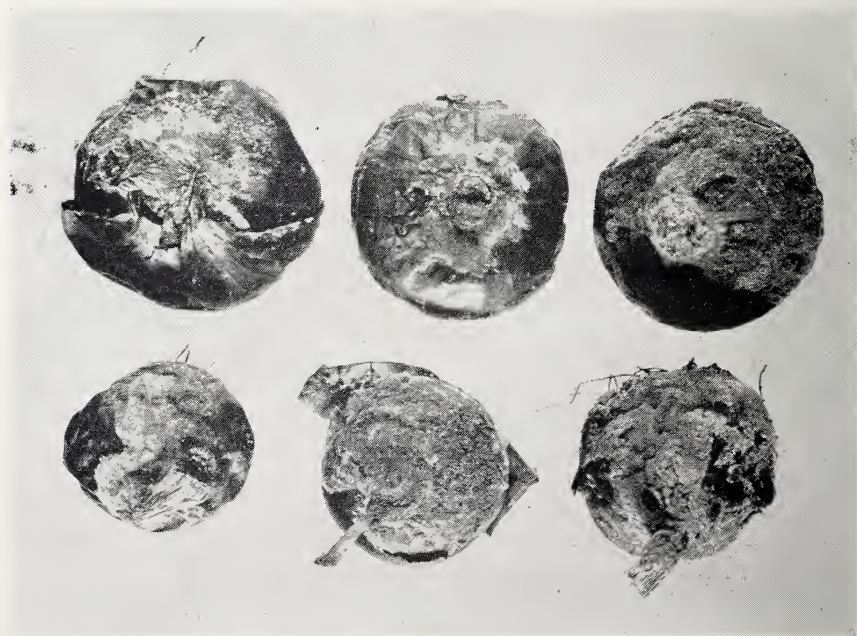
controlled by multiple factors. The data also indicated the dominance of low-solids percentage over high-solids.

Effects of Preharvest Foliage Sprays of Maleic Hydrazide on Sprouting of Onion Bulbs

In connection with the onion breeding program one of the serious problems has been the premature sprouting of the bulbs in storage. An experiment was set up in 1950-51 to determine the effect of maleic hydrazide on sprouting of Calred onions. Four concentrations of the material, from 500 to 3,000 ppm, were sprayed on the plants just before they reached maturity. After 16 weeks in cold storage there was little apparent effect of the maleic hydrazide on the bulbs. The treated bulbs sprouted about the same as the untreated. When the treated bulbs were set in the field most of them failed to grow. Those treated with 2,000 and 3,000 ppm did not grow at all.

Storage Rots in Onion Breeding Material

Another of the problems in onion breeding for resistance to mildew has been the loss of valuable bulbs in storage. The Creole onion keeps well but the Calred and the Creole-Calred hybrids rot badly in storage. The losses in storage have been heavy among the hybrid bulbs even when stored at 35° F., while in common



Botrytis allii on Calred-Creole hybrid onions from cold storage at 35° F.

storage all the Calred and most of the hybrids were lost during the summer.

The principal organisms associated with the rotting of onion bulbs in storage in order of their importance were *Botrytis allii*, *aspergillus niger*, *Penicillium* sp., *Fusarium* sp. and soft rot bacteria. One apparently new fungus pathogenic to onions in cold storage has been found. —*E. C. Tims and Warid A. Warid*

Studies on Vetch Diseases and Field Tests

Emphasis has been placed upon a study of leaf, stem and root diseases of vetch in Louisiana and the relative disease resistance of the various vetches (*Vicia* spp). Although common and hairy vetch are the two species of most importance, others such as purple, woolypod, Hungarian, and native or wild vetch were included in the various tests.

A comparative study of two anthracnose diseases of vetch has been completed. *Colletotrichum villosum*, described from Georgia a number of years ago, causes an anthracnose disease on hairy vetch. Anthracnose has not been as severe on hairy vetch in Louisiana as a similar anthracnose on common vetch. A new *colletotrichum* was found causing severe defoliation and killing of the stems on common vetch when favored by wet weather. Hairy vetch was found to be resistant to the new anthracnose disease. None of the vetches were resistant to both diseases.

TABLE 1. Reaction of ten vetch species to the hairy and common vetch anthracnose diseases.

Vetch species	Common name	Hairy vetch anthracnose	Common vetch anthracnose
<i>V. villosa</i>	Hairy	S	R
<i>V. benghalensis</i>	Purple	S	R
<i>V. sativa</i>	Common	R	S
<i>V. pannonica</i>	Hungarian	R	S
<i>V. grandiflora</i>	Big-flower	R	S
<i>V. dasycarpa</i>	Woolypod	S	S
<i>V. articulata</i>	Monantha	S	S
<i>V. angustifolia</i>	Narrow leaf*	R	S
<i>V. ludoviciana</i>	Louisiana*	S	R
<i>V. hirsuta</i>	Tiny*	R	S

* Seed collected from local wild plants

Common vetch has been found susceptible to a root rot complex and grows poorly on land successively planted with common vetch or peas of the Austrian Winter type. Hairy and purple vetch are resistant to root rot and some of the other vetches are somewhat resistant. Studies have also included the relative resistance of the various vetches to a group of minor diseases, such as

downy mildew, powdery mildew, Botrytis, and Sclerotinia stem rot. Hairy vetch has also been found susceptible to root knot but this disease has been found only in some test plots at Baton Rouge.

Severe cold weather in early 1951 revealed differences in the cold resistance of the various vetches. Hairy vetch was the most resistant to cold while purple was the most susceptible. Some of the strains of common vetch were more susceptible than others.

Field plots at Baton Rouge and in Franklin Parish have demonstrated the superiority of hairy vetch over common vetch and peas of the Austrian Winter type from the standpoint of green growth available for plowing under. The better growth of hairy vetch has been attributed to disease and cold resistance. The studies have demonstrated that hairy vetch makes good growth on land where common vetch and Austrian Winter peas have failed when planted in successive seasons. The planting of Austrian Winter and Dixie Wonder peas and common vetch should be confined to land not planted for three or more years or where satisfactory growth has been obtained in previous years. Other legumes, such as crimson clover, have proved satisfactory on infested fields. Agronomic recommendations such as inoculation, phosphate fertilization, method of planting, and time of planting should be followed. —*J. G. Atkins, Jr. and N. L. Horn*

Control of Corky Excrescence of Camellias

Previous work (published) has shown that excellent control of this disorder could be obtained by 3 to 4 sprayings with a wax (Dowax 222) emulsion diluted 1:30 with water and applied at approximately monthly intervals between June and September. In last year's (1950) experiments, the wax emulsion was used at a lower concentration (1 part in 50 parts of water). Prince Eugene Napoleon camellias, the most susceptible variety, were used. These were divided into four groups of 15 plants each. The plants in group I were sprayed 3 times (June 26, August 6, and September 8), those of group II twice (August 6 and September 8), those of group III once (September 8), and those of group IV were left unsprayed. Complete prevention of cork was obtained in groups I and II and only partial control in group III. However, severe foliage injury resulted from the June and August sprayings and minor injury from the September application. The reason why severe injury resulted in 1951 and not in the previous two years is not clear, particularly since a lower concentration of wax was used, but the extremely hot and dry weather prevailing in the summer of 1951 was probably responsible. It is evident, however, that additional investigations to determine the conditions under which injury is likely to occur are necessary before wax emulsion

sprays can be safely recommended for the control of corky ex-
crescence.

In another experiment, a latex, "good-rite VL 600," diluted 1:10 with water, was used to spray a group of 10 Prince Eugene Napoleon plants. Three applications were made, June 26, Aug. 6, Sept. 8. Very good control (nearly 100 per cent) was obtained with no apparent injury to the plants. —A. G. Plakidas

Transmission of Leaf and Flower Variegation in *Camellia japonica*

Many camellia varieties come in two forms, one with solid-colored flowers and the other with variegated flowers. The latter have been generally considered in the past as having originated as "bud sports" from the former. Most of the varieties with variegated flowers also show varying degrees of chlorotic splotching of the foliage. Since it has been shown by other workers that the chlorotic splotching of the leaves is graft-transmissible, and presumably of virus nature, the writer considered the possibility that color breaking of the flowers is due to virus infection rather than to bud mutation.



Color-breaking (white spots) in flower of Mathotiana (Purple Dawn) transmitted from Mathotiana variant (C.M. Hovey) by grafting scions of the two varieties on opposite branches of the same rootstock.

A grafting experiment was started early in 1950 and expanded since then. The method used is a simple one. *Camellia sasanqua* plants with two graftable branches are used as rootstock. Scions from a variety with solid-colored flowers are grafted onto one of the branches and scions from a variety with variegated flowers onto the other.

Two of the 1950 graft combinations were completely successful, i.e., both the solid-colored and the variegated scions made union and grew. These were: Mathotiana (Purple Dawn), Solid Color X Mathotiana Variant (C.M. Hovey), Variegated, and Reverend John Bennett,

Solid Color X Mathotiana Variant (C.M. Hovey), Variegated.

No symptoms of variegation showed on the solid colored scion the first season (1950 growth). The second season (1951) the new growth of both solid-colored scions (Mathotiana and Reverend John Bennett) was severely splotched with irregular, bright yellow spots. The Mathotiana (Purple Dawn) produced one flower and this was variegated. The Reverend John Bennett did not flower. These results suggest that both the leaf variegation and the color breaking of flowers are graft-transmissible and presumably of virus nature. —A. G. Plakidas

Camellia Root Rot and Dieback

The symptoms of dieback of camellias vary greatly in degree of severity. In mild cases, small individual twigs or larger branches die, the rest of the plant appearing healthy. In more severe cases, the whole plant is in a weak, unhealthy condition with sparse, small-sized, off-color foliage and general dieback of its top shoots. Usually bark cankers accompany dieback. Regardless of the type of dieback, a fungus, *Colletotrichum* sp. is practically always associated with dieback and it can be easily isolated from the bark and wood of cankers and dieback shoots, but attempts to reproduce the disease by inoculating healthy plants with pure cultures of this fungus have not been very successful in the past. A concerted effort was therefore made to determine if dieback can be reproduced by inoculating with pure cultures of the fungus and under what conditions infection takes place. Positive results were obtained by three methods of inoculation, namely, (1) inserting the inoculum in incisions in the bark, (2) removing the leaves mechanically and spraying the plant with a spore suspension, and (3) by inducing leaf abscission by deblading and then spraying the plant with a spore suspension. Small twigs were killed within a few weeks; in larger branches, cankers formed which enlarged very slowly, requiring several months to completely girdle and kill the branch. Practically no infection was secured by inoculating without wounding.

Severe cases of dieback are associated with failure (decay) of the root system. Since it has been shown previously that *Phytophthora cinnamomi* can cause root rot, two tests were run to get information on the relative susceptibility of some varieties of *C. japonica* and *C. sasanqua*. Rooted cuttings of Sarah Frost, Flora Plena, and *C. sasanqua* were planted in soil infested with *P. cinnamomi*. All the Sarah Frost and Flora Plena cuttings were killed; more than 50 per cent of the sasanqua cuttings survived. In another experiment, one-year-old plants of 5 *C. japonica* varieties, Alba Plena, Pink Perfection, Herme, Professor Sargent, and

Sarah Frost, were planted in soil artificially infested with *P. cinnamomi*. Sarah Frost proved tolerant to root rot under these conditions. The other four varieties proved very susceptible.

—L. W. Baxter, Jr. and A. G. Plakidas

Plant Parasitic Nematodes in Louisiana

Among 41 collections of root-knot nematodes obtained from different parts of the state, the following species were found: *Meloidogyne hapla*, *M. incognita* and *M. incognita* var *acrita*. The species *M. hapla* was found on strawberry plants. *M. incognita* was found on cotton, sweet potato, lima bean, okra, tomato, crowder pea, *Amaranthus* sp. and gardenia. *M. incognita* var *acrita* was found on cotton, snapbean, tomato, cucumber, okra, beet, mustard, fig, white clover, hairy vetch, *Lamium amplexicaule*, *Amaranthus* sp. and *Convolvulus* sp.

Occurrence of the smooth-headed meadow nematode, *Pratylenchus leiocephalus*, was recorded on the following plants: cotton, tomato, strawberry, lima bean, okra, peanut, cowpea, lespedeza, crabgrass and *Cassia chamaecrista*.

Other parasitic species found were *Tylenchorhynchus* sp. (probably *T. claytoni*) on strawberry plants, *Rotylenchus multicinctus* on tomato and *Rotylenchus* sp. on lespedeza.

—W. J. Martin, H. Weitz, and W. Birchfield

Poultry Research

Influence of the Level of Nutrient Intake on the Performance of Poultry of Different Ages

Much has been said regarding the particular system of feeding that will yield the best results with poultry. At the present time there is considerable discussion regarding the use of the mash-grain system of feeding. Previous studies have shown that growing birds and mature birds when maintained on a mash-grain system of feeding will consume varying amounts of mash and grain. This system of feeding is predicated on the assumption that the birds will consume approximately the same amounts of mash and grain. Experience has shown that on a free choice system of feeding the birds may consume as little as one-third of their total intake of feed in the form of mash. The results of such a low intake of mash would be an over-all limitation of nutrients except for those nutrients adequately supplied in the grain mixture. The problem of limited grain feeding as compared to free choice grain feeding is being studied at the present time. The performance of various breeds of chickens on these two methods of feeding is being compared. The bird's life is divided into three phases for this study. The starting phase will include the chick from one day of age to ten weeks of age. The growing phase will cover the period from ten weeks to twenty weeks of age. The mature phase will cover the birds from twenty weeks of age to the end of their first laying year.

This past summer birds were compared during the growing phase, i.e., ten to twenty weeks of age. The three breeds studied were a meat strain of New Hampshire, an egg strain of New Hampshire, and the Dark Cornish. The meat strain New Hampshires were most efficient when maintained on the limited grain system of feeding during the growing period. The amount of grain they were allowed to consume was restricted to one-third of the total amount of feed that they consumed. The egg strain New Hampshires were most efficient when allowed to consume mash and grain free choice. The Dark Cornish responded in the same manner as did the egg strain New Hampshires. Mortality was low in all the groups and did not seem to be a factor in either of the treatments.

Last fall, at the end of the growing phase, when the birds were twenty weeks of age, they were redivided in such a manner that a study can be made of any carry-over effect of the treatment

during the growing phase on the performance during the subsequent laying year. This phase of the study is in progress at the present time. —A. B. Watts

Meat Yields of Broilers

Interest is increasing among broiler growers and hatcherymen concerning the meat yields of various breeds and strains of broilers. In three trials with 12-week-old broilers of seven different breeds, crosses, and strains, significant differences were obtained in breast and total meat yields. These measurements were taken when the birds reached 12 weeks of age. Since all breeds and strains do not have the same rate of growth it was thought that a measure of yield at a given age might not be the most desired method of comparing meat yields. Three breeds, White Plymouth Rock, Dark Cornish and Indian River Cross, were compared at a definite weight of 4.5 pounds for the males and 3.5 pounds for the females. To insure obtaining samples at these weights the birds were weighed individually every other day and the first 10 males and 10 females to reach the desired weights were measured. To find the possible cause for variation in dressing and meat yields eight weights were taken. These are live weight, dressed weight (blood and feathers removed), and weights of legs, head, giblets, intestines, breast meat, and total meat. All weights were in grams and read to the nearest gram.

Differences exist between the three breeds for the eight measurements observed. Eviscerated weight as per cent of live weight was highest for the Dark Cornish males and females. The same holds true for breast meat and total meat yield. The yields for the Dark Cornish males were: eviscerated weight, 81.3 per cent (of dressed weight); breast meat, 16.11 per cent; and total meat yield, 42.08 per cent. These were followed by the White Plymouth Rock and Indian River. The increase of 6 per cent that eviscerated weight was of dressed weight (Dark Cornish males 81.3, W. Plymouth Rock males 75.44) may be of economic importance. It would allow the processor to obtain a larger yield and pay the grower a higher price per pound for the live bird.

The 6 per cent increase in eviscerated yield is due in part to the lower percentage of intestine, legs and head weights exhibited by the Dark Cornish. They had 10 per cent, 5 per cent and 3.5 per cent respectively as compared to 13 per cent, 6 per cent and 4 per cent for the Indian River. Since the Dark Cornish had the highest total meat yield (755 grams compared to the low of 637) it might indicate that the Dark Cornish has a smaller skeletal structure than the other breeds and crosses of the same size.

To obtain additional data on meat yields of broilers of the

same age, 31 lots of five males and five females of New Hampshire, White Plymouth Rock, crosses with Cornish, crosses without Cornish, and miscellaneous breeds were tested. Seven weights were taken, i.e., dressed, legs, head, intestine, giblets, breast meat, and total meat yields. All weights were obtained to the nearest gram. The 31 pens had been raised under similar management practices.

In the yield of eviscerated weight as a per cent of dressed weight there was a difference of 1.15 per cent, the crosses with Cornish ranking highest with 79.84 per cent and the crosses without Cornish being lowest with 78.69 per cent. There was a range of .73 per cent in the total meat yield, the crosses with Cornish ranking highest with 42.34 per cent and the crosses without Cornish being lowest with 41.61 per cent. These data supported the work previously done here and our present work with birds of given sizes or weights indicates that the differences in these weights will be magnified and the reasons for the differences may be determined. —*H. E. Hathaway and C. W. Upp*

Effect of Season and Temperature on Broiler Production in Louisiana

It is commonly believed that weather conditions greatly affect broiler production. The purpose of this experiment is to determine to what extent, if any, environmental conditions affect efficiency of production.

Four seasonal trials each consisting of eight lots of 100 straight run chicks per lot were completed this year. Four different breeds or strains grown to 10 weeks of age in an air conditioned room were compared with the same strains grown under natural climatic conditions. The controlled temperature room was designed and constructed with the assistance of the Agricultural Engineering Department of this station and a local contractor. Numerous difficulties have been encountered. Various measures were taken to overcome them. The rate of air flow was decreased and burlap bags placed over the air inlets to better diffuse the air flow. The fresh air intake duct was enlarged and a small exhaust fan installed. The room temperature for starting the chicks was raised from 70° F. to 75-79° F. Pans filled with boric (later phosphoric) acid were installed at each air inlet. The burlap bags were arranged to serve as wicks to aid in the absorption of ammonia. Changing the litter, additions of superphosphate to the litter, and operating an ozone machine in the room were also used in attempts to keep down ammonia fumes. Complete control of the ammonia fumes has not been attained as yet.

Controlled temperature lots produced slightly better growth

rates than did the natural temperature lots except in the fall trial, in which the natural temperature lots averaged 4.32 grams per bird more than birds grown under controlled temperature. The greatest difference in growth rate was obtained in the spring trial, in which the controlled temperature lots exceeded those under natural temperature by 142.9 grams (5 ounces) per bird. No significant differences in feed efficiency were observed between the two methods, although efficiency was slightly better in the controlled temperature lots. Growth rates were practically the same in controlled temperature lots for the four seasons, 2.8 pounds per bird during the summer, 2.7 during the fall, 2.6 during the winter, and 2.6 during the spring. Feed consumed per pound of gain was 2.9, 3.0, 3.7, and 3.3 respectively. Results of growth rates for natural temperature lots by seasons show the same trend: summer 2.5 pounds, fall 2.5, winter 2.5, and spring 2.3. Feed efficiency figures for natural temperature lots were as follows: summer 3.0, fall 3.0, winter 4.0, and spring 3.8. No outstanding differences in mortality occurred between natural temperature and controlled temperature lots.

The data presented here indicate that broilers can be grown on a year-round basis with little seasonal fluctuation in efficiency of production. Controlling temperature makes for a more uniform seasonal production with some improvement in rate of growth and feed efficiency although the expense of constructing and operating an air conditioned building more than offsets this improvement. —*W. D. Blackwell and C. W. Upp*

Improvement by Breeding

Three phases of breeding work are receiving major attention. One of these is the continuing improvement of productive qualities in stock that is made available to farmers of the state through the sale of breeding stock to flock owners producing hatching eggs and to hatcheries. For example, the egg type New Hampshires and the White Plymouth Rocks developed in the Experiment Station flock are increasing in demand even though many flock owners and hatcherymen are producing broiler stock primarily. This is an indication that, although broiler production is increasing in the state, broiler stock is not best adapted for general farm flock use nor for commercial market egg production. The records made by the Station's New Hampshires last year are the best they have ever made and are among the best made in the United States last year.

A second phase of breeding is concerned with the improvement of productive qualities of the Cornish breed. This breed has certain very desirable meat qualities which have led to its extensive use in producing crossbred broiler stock. The breed itself

needs improvement in such productive qualities as number and size of eggs produced, growth rate, etc. Improvements are being made in such characters. In addition stress is being given to introduce white color and the silver pattern in the stock because of greater ease in processing light colored birds. Crossbreeding tests are underway and some of them are yielding very encouraging results.

A third phase of breeding work that involves a long time program is the development of inbred lines of White Plymouth Rocks for subsequent use in hybridization, that is, the crossing of inbred stocks to produce commercially valuable stocks. This work has progressed to the stage where certain of the inbred stocks are being tested in top-crosses and in single crosses of inbred lines. Some inbred stocks are being exchanged with other experiment stations and test stock will be sent this year to the Regional Poultry Breeding Station for comparison under uniform conditions.

—B. A. Tower, Ernest Williams, and C. W. Upp

The Inheritance of Morphological Abnormalities

Poultry breeders discard thousands of birds each year because they have some unsightly abnormality. It would mean dollars and cents to the poultryman if he could avoid growing out these culls and produce a more saleable product. Some of these abnormalities have been found to be rather simply inherited and can be eliminated from flocks by proper breeding techniques. Others are still under investigation.

Breeding tests were continued for the following abnormal characters: telescoped comb, the presence of a black pigment in the abdominal fat and connective tissue of broilers, and irregularly serrated combs. In previous reports the "irregularly serrated comb" character was called "non-serrated comb." This change is made because all birds carrying this condition do not have complete absence of serrations. Variation is from combs practically smooth to those having as many as 9 serrations but abnormal as to spacing and size.

Telescoped Comb—The incidence of telescoped progeny from telescoped parents mated inter se in 1951 shows approximately 65 per cent increase over that obtained from the same type matings in 1949. This increase probably is due to two factors: (1) through selective breeding the character has become better fixed in the stock; (2) age at first classification of progeny began at 8 weeks in 1949 and at 4 weeks in 1951. The latter factor is important in determining the incidence of the character. The condition is not manifested at the same age for all birds nor is it permanent in all affected birds. Birds that are telescoped early in life may be-

come normal adults and vice versa. Approximately 63 per cent of these changes occur between the fourth and eighth week of age. Nevertheless, these "grow outs" transmit the character as frequently as birds permanently telescoped. Three sires that were telescoped at an early age but later became normal produced 83.3, 66.0 and 83.3 per cent telescoped progeny when mated to females of the same type. Matings of "grow out" males to permanently telescoped females and the reciprocal mating produced affected progeny of 81.8 and 92.3 per cent respectively. Three matings of telescoped birds to normal birds and vice versa resulted in 97.0, 84.6 and 80.6 per cent normal progeny. In telescope by telescope matings, 91.6, 66.6 and 58.3 per cent of the progeny were affected. The latter figure represents the results of a mating in which the dams had one normal parent. An unrelated telescoped Wyandotte sire produced 30.50 per cent telescoped progeny from normal dams and 62.06 per cent from telescoped dams. This is not consistent with the results obtained from similar matings of the regular telescoped stock. A possible explanation for the behavior of this sire is that the telescope trait introduced from other stock and associated with rose comb may be different genetically from that of the single comb in all other stock.

The foregoing results and previous data indicate the inheritance of the telescope comb on an autosomal, recessive base with one pair of genes chiefly responsible.

Melanic Pigment—Some 150 progeny from two pens were killed and eviscerated at 12 weeks of age to determine the presence or absence of a melanic pigment in the abdominal region. In live birds, the pigment is recognized by a bluish green appearance of the abdomen in the area between the pubic bones and the end of the keel bone on either side of the abdominal feather tract. It is most easily recognized externally when the birds are 4-12 weeks of age. In adult birds the affected area is difficult to examine due to the large feathers, and the pigment may be obscured by large fat deposits and a thicker skin. Matings of normal by normal and pigmented by pigmented birds resulted in an affected progeny of 81.6 and 78.6 per cent respectively. Reciprocal matings of normal and pigmented birds produced 72.3 per cent pigmented offspring. These data give little indication of a pattern of inheritance. However, in all matings, 91.7 per cent of the females and 75.1 per cent of the males were carriers of the pigment.

Irregular Serrations—Of 81 progeny classified from irregularly serrated birds mated inter se, 92.5 per cent had irregular serrations. This represented an increase of approximately 20 per cent in the expression of the character as compared to previous matings. Twenty-one of the 81 classified had combs that were practically smooth while the remaining 60 had irregular serrations vary-

ing from two to eight per comb. Matings of normally serrated birds to those having irregular serrations resulted in 80 per cent normal progeny. These percentages indicate that the irregular serration character may be inherited recessively.

—*W. D. Blackwell and C. W. Upp*

Built-Up Litter

Built-up litter has received much publicity during the past few years. Just what is "built-up" litter? It is litter six to twelve inches deep that is used for a relatively long period (for several broods of broilers or for about a year or longer for layers). More litter is added periodically. An important feature of built-up litter is that it is kept in good condition, dry and loose, by stirring and when necessary by the addition of superphosphate. Built-up litter is of nutritive value to broilers and to hens, as it contains the so-called animal protein factor or vitamin B₁₂. In recent tests with broilers at the Station chicks grown on built-up litter weighed on the average .3 pound more at eight weeks of age than did chicks of the same breed and age that were grown on the same diet but on "new" litter. The production records of laying hens kept on fresh (re-newed) litter, control (or neglected) litter, and built-up litter are being determined at the present time.

—*R. J. Champagne, A. B. Watts and C. W. Upp*

Rural Sociology

The Health Status and Health Needs of Louisiana's Rural People

During the past year research has been continued concerning the crucial problem of the health status of people in rural Louisiana. Data for 1950 recently made available by the Federal Census and by the Department of Health of the State of Louisiana provide insight into the health status of rural people for that year. Comparisons of indexes based on these materials with those for 1940 indicate the nature of important trends which are developing in health matters. The death rate for the state as a whole has declined from 10.8 per 1,000 persons in 1940 to 9.1 in 1950.

The analysis of trends in the death rate according to the rural and urban components of the state's population reveals that the reduction in mortality has occurred primarily among urban people. The death rate among rural people has remained approximately the same as that recorded for 1940. Among urban people of the state, the death rate declined from 13.7 in 1940 to 9.5 in 1950. Comparable rates for rural people are 8.7 and 8.5, respectively.

Death rates calculated by race as well as residence show that the greatest reduction occurred among urban Negroes (17.9 in 1940 as compared to 12.2 in 1950). The rate among rural Negroes declined from 11.4 in 1940 to 10.5 in 1950. Among urban whites the corresponding decline was from 11.7 to 8.2. However, the death rate among rural whites changed but little during this decade under study, rising slightly from 7.1 to 7.3. These data indicate that the declining death rate recorded for Louisiana between 1940 and 1950 resulted from decreases occurring principally among the urban people of the state. No such reduction characterized the mortality experience of rural people, as their death rate remained about the same in 1950 as it was in 1940.

The 1950 data also show that all of the previously established differentials still existed: (1) whites have lower death rates than Negroes, (2) females have lower death rates than males, and (3) rural people have lower death rates than urban people, although this differential has been narrowed greatly.

Diseases of the heart continue to be the leading cause of death of Louisiana's citizens, taking an even greater toll in 1950 than 10 years before. Specifically, in the state, 313.5 persons per 100,000 in 1950 as compared with 256 persons in 1940 succumbed

to these diseases. Cancer and other malignant tumors, ranking only fourth as a cause of death in 1940, had become second in importance by 1950. Diseases of the nervous system caused the third largest number of deaths in 1950, whereas ten years earlier they were fifth in importance. Tuberculosis, although moving from sixth to fourth place as a cause of death between 1940 and 1950, took proportionately less than one-half the number of lives in the latter year, the rates per 100,000 being 58.7 and 27.8, respectively. Pneumonia and influenza, ranking second in 1940, had declined to fifth place in 1950. This change of rank was accompanied by the phenomenal reduction of deaths due to pneumonia and influenza of from 106.9 per 100,000 in 1940 to only 27.0 in 1950. Motor vehicle accidents increased in relative importance as a killer, ranking seventh in 1950 but tenth in 1940. Nephritis, ranking third in 1940, had slipped to ninth place in 1950. The trend appears to be toward the progressively greater importance of degenerative diseases as causes of death in the state. On the other hand, mortality due to transmissible diseases showed significant decreases between 1940 and 1950.

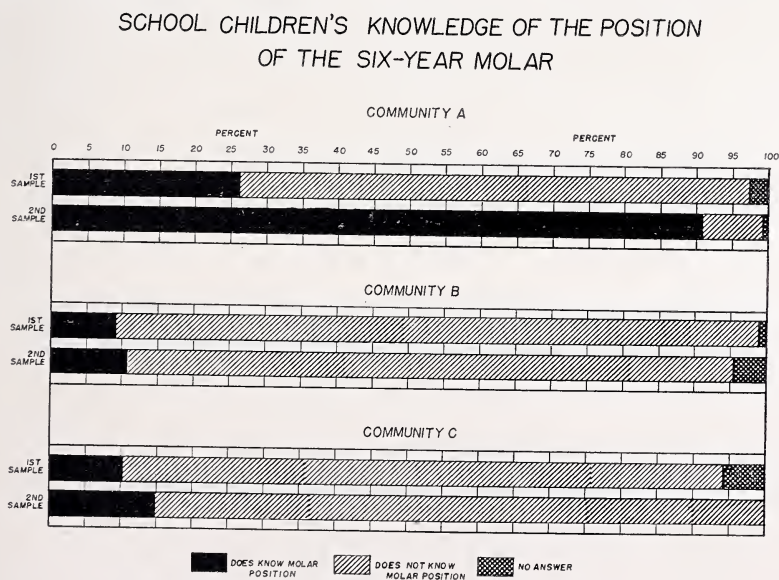
Since much of the health needs and many of the health problems are closely related to the aging process, considerable effort has been made to analyze the status of the aged in Louisiana's rural population. In 1950, persons 65 years of age and over made up 6.6 per cent of the total population of the state of Louisiana. Persons in this age group constituted 6.3 per cent of the rural-farm population. They accounted for 7.4 per cent of the rural-non-farm population and for 6.4 per cent of the urban population. The aged (persons 65 years of age and over) numbered 176,789 persons in the total population in 1950, of whom 35,570 resided on farms. Furthermore, there is evidence that the proportion of aged in the population has not yet reached its maximum. Data from the 1950 Census reveal that only nine states have smaller proportions of aged in their populations than does Louisiana. On the other hand, the percentage increase of the aged in Louisiana between 1940 and 1950 was surpassed by that in only five states. It thus seems likely that the state must plan for a larger proportion of aged in its future population than it has at the present time.

—*Homer L. Hitt and Paul H. Price*

Modifying Dental Attitudes Through Community Programs

The study which was undertaken by the Department of Rural Sociology in cooperation with the Dental Section of the Louisiana State Department of Health has been continued during the past year. Data have been collected in the field and their analysis is

The primary objective of the study is to determine, at the request of the Health Department, the effectiveness of procedures and techniques used by the Dental Section in community programs which are designed to make parents, children, and teachers aware of the importance of the care of children's teeth. The preliminary results of this research undertaking indicate that these programs are successful in disseminating facts regarding the care and development of children's teeth to students and teachers. Definite results of the dental program can be observed in the response of school children to the question "Do you know the position in your mouth of the six-year molar?" At the time of the first survey only 26.1 per cent of the students in Community A possessed such knowledge. A comparable figure at the completion of the program was 90.7 per cent. Communities B and C (the control groups) recorded only insignificant changes in the proportions of children possessing such information. (See Figure 1.) Many other examples could be cited to illustrate the effectiveness of the dental program in disseminating knowledge concerning the development of children's teeth. The program appears to have been particularly



effective in this respect among the children and their teachers, but only moderately successful among the adults of the community.

Specific examples of the success of the dental program in modifying practices regarding the care of children's teeth may be cited from the study. In the first survey (before the initiation of the dental program), only 6.1 per cent of the pupils of Community A reported that their teachers had ever made examinations of their gums. Similar percentages in Communities B and C were 12.6 and 12.1, respectively. In the resurvey, approximately one year later (after an educational program in Community A), 98.1 per cent of the students of Community A responded in the affirmative when asked if the teachers examined their gums. No such change in the proportion of students reporting the existence of this practice occurred in Communities B and C. Such a tendency must be attributed to the dental program which was conducted in Community A.

The problems of modifying dental attitudes are apparently more difficult than those of modifying dental practices and disseminating knowledge concerning the development of children's teeth. Results of the study indicate that changes occurring in dental attitudes among children and adults as a result of the dental

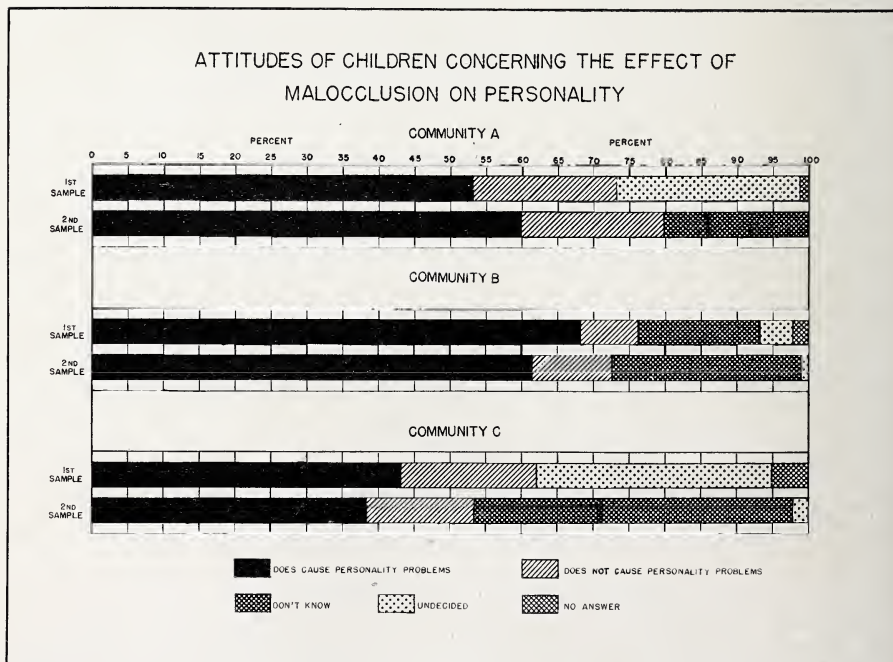


Figure 2. Attitudes of Children Concerning the Effect of Malocclusion on Personality. (Before and After the Dental Program Conducted in Community A.)

program were relatively slight. In other words, the attitudes of children and parents toward dental care for children were only slightly modified by the dental program. Figure 2 depicts the attitudes of children in regard to the effects of malocclusion on personality. The chart indicates that the proportion of children of the opinion that malocclusion does cause personality problems varied only slightly in the first and second surveys. The same tendency was noted among adults in the various communities.

—*Paul H. Price*

The Social Effects of Agricultural Mechanization

Past reports have made it clear that the rural scene in Louisiana is undergoing rapid transformation because of the increased application of technology to agriculture. Research completed during the past year shows that the enthusiastic reception accorded mechanization by farmers of the state has not only altered the economics of farming itself but has brought about profound changes in the composition of the rural population and in the rural social institutions. The specific nature of the changes which were discovered may be summarized as follows.

Mechanization of Louisiana agricultural systems over the last 20 years has been responsible for a steady advance in the number of trucks, tractors, implements, and machinery on farms; a rapid decrease in the number of draft animals on farms; an increase of livestock other than workstock on farms; an increase in the size of farms; an increase in cropland per farm; a decrease in the number of tenants and sharecroppers on farms; an increase in the use of wage-labor on farms; and the introduction of new and improved practices on farms. Other socio-economic changes which are more or less directly related to agricultural mechanization include an increase in owner-operated farms; an increase in absentee ownership of farms; an increase in total value of farm products produced; and a decrease in mutual-aid practices.

Changes in rural social institutions associated with mechanization include a loosening of the home ties on individual members of the rural family and the loss of many of the rural family's functions to other institutions; improvements in the equipment of rural schools and the acquisition of better-trained teaching personnel in these schools: an increase in school attendance on the part of rural children: a decline in the influence of the church on the rural population; and an increase in social participation in general. Changes in rural social institutions of the above nature argue conclusively that rural people in Louisiana are rapidly changing in their habits and actions.

The full implications of socio-economic changes brought on by agricultural mechanization to farmers of the state are of great

significance. Already these have resulted in more leisure time and a higher level-of-living for the rural-farm population. The over-all picture indicates beyond doubt that the rural population is progressively becoming more urban-like. This fact has profound implications, not only for the farm people themselves, but for agricultural workers, planners for agriculture, and others concerned with rural life as well. —*Alvin L. Bertrand*

The Number, Characteristics, and Needs of Older Youth in Rural Louisiana

It is generally recognized that the future of the nation rests on the shoulders of its youth. Consequently, it is important that information be accumulated relative to the characteristics and needs of rural young people. Such research assumes even greater significance when one contemplates the momentous decisions in connection with leaving the family group, preparing for an occupation or vocation, getting married, establishing a home, buying a farm, mapping out farming operations, rearing a family, etc., which people of this age must make and concerning which they should welcome reliable information and instruction. This type of information, of course, is also valuable to agricultural planners. With the above considerations in mind the Department of Rural Sociology has initiated research into the characteristics and needs of rural youths in Louisiana.

The method of investigation involves three steps as follows: (1) The construction of a detailed and comprehensive schedule in collaboration with Agricultural Extension Service and other specialists. (2) The selection of representative study areas throughout the state and the interviewing of older youths residing in these areas. (3) The analysis of data obtained from the survey as well as of pertinent information which may be obtained elsewhere and the preparation of a comprehensive report of all findings for the use of interested persons.

The first phase of the study outlined above has been completed. After considerable review and testing, a satisfactory schedule has been designed. This schedule will provide detailed information relative to the socio-economic characteristics, problems, and plans of the older youths in rural areas of Louisiana. To determine the number and distribution of these youths as much information as necessary has already been tabulated from the 1940 Census for later comparison, when available, with the 1950 Census data. Pertinent literature to this study has also been assembled and examined. In addition, representative areas in all the type-farming and cultural regions of the state have been selected for sampling. A complete report of the findings of this study will be available by early 1953. —*Alvin L. Bertrand*

Sugar Cane

Sugar Cane Test Fields

Sugar cane variety work was conducted in the usual manner at the eight Experiment Station test field locations during the 1951 season. A total of 25 experimental fields of commercial varieties and of the most promising unreleased seedlings, about equally divided as plant cane, first, and second stubble, were harvested and tested during an interval of 42 days of the sugar cane milling season, under extremely adverse weather conditions and an early November bud-killing freeze.

Test Field Plantings

Introductory—First plantings on a small-plot scale were made of the following varieties: C.P. Nos. 47-49, 48-117, 48-124, 49-19, 49-27, 49-35, and 49-38. Seed cane of these varieties was grown at the Louisiana State University Sugar Experiment Station, and taken by cooperators' trucks to each of the eight test fields. Nine new fields were planted, ranging from two to four acres in size and comprising a total of 30.7 acres. An average of six commercial and twelve unreleased varieties were planted at each test field. Plantings were made on the following dates: September 19, Glenwood; September 20-21, Cinclare; October 1, Billeaud; October 3, Reserve; October 5, Shirley; October 10, Caffery; October 15, Meeker; and October 17-18, Youngsville.

1951 Evaluation of Varieties

For each test field, the four highest ranking varieties in the order given performed best from a sugar-per-acre standpoint during the 1951 season.

CINCLARE (Mhoon very fine sandy loam): C.P. Nos. 44-101, 36-105, 44-155, and 43-47. (Bowdre-Sharkey clays): C.P. Nos. 44-101, 44-154,* 45-184,* and 33-224.*

GLENWOOD (Mhoon very fine sandy loam): C.P. Nos. 36-105, 44-101, 45-184,* and 44-155.

RESERVE (Mhoon very fine sandy loam): C.P. Nos. 36-105, 44-101, 45-184,* and 34-120.

MEEKER (Yahola very fine sand): C.P. Nos. 45-184,* 44-101, 36-13, and 43-33.*

SHIRLEY (Yahola very fine sandy loam): C.P. Nos. 36-105, 29-320, 45-184,* and 44-101,

* Unreleased varieties.

CAFFERY (Baldwin silty clay loam) : C.P. Nos. 44-101, 43-47, 44-154,* and 44-155.

BILLEAUD (Lintonia-Olivier silt loams) : C.P. Nos. 36-13, F. 31-762,* 44-154,* and 45-184.*

YOUNGSVILLE (Richland-Olivier silt loams) : C.P. Nos. 44-101, 45-184,* 44-155, and 43-47.

In the evaluation of the varieties, the ratings are based on averages of sugar per acre yields as follows: (1) plant cane and first stubble: Cinclare, Billeaud and Youngsville; and (2) plant cane, first, and second stubble: Glenwood, Reserve, Meeker, Shirley, and Caffery.

Unreleased Varieties

In the second stubble results, C.P. 43-9 continued to show some promise by ranking second at Glenwood and Shirley and third at the Caffery test field.

C.P. 44-153 made a favorable showing as second stubble at Reserve and Youngsville.

At Cinclare (Bowdre-Sharkey clays), C.P. 33-224 was the fourth ranking variety.

F. 31-762 ranked second at Billeaud test field.

The following three varieties made a favorable showing in the plant cane tests: (1) C.P. 44-92 ranked fourth at Glenwood; (2) C.P. 45-153 ranked first at Glenwood and Meeker and second at Youngsville; (3) C.P. 47-193 ranked first at Reserve and fifth at Glenwood.

In the evaluation of varieties, C.P. 44-154 showed up best at the following test fields: Caffery, Billeaud, and Cinclare (Bowdre-Sharkey clays).

C.P. 45-184 made the best showing in the unreleased varieties, ranking as follows: first at Meeker; third at Glenwood, Reserve and Shirley; second at Youngsville; and fourth at Billeaud.

—C. B. Gouaux

Varieties

During the fall of 1951 seven new sugar cane varieties were sent to each of the eight test fields of this Station. These were C.P. Nos. 47-49, 48-117, 48-124, 49-19, 49-27, 49-35, and 49-38. Seed cane of these varieties was also made available to the American Sugar Cane League for planting on their Smithfield Primary Seed Increase Station.

The varieties C.P. 44-101 and C.P. 44-155, which were released for commercial cultivation in the fall of 1949, are rapidly being extended under cultivation throughout the sugar district

*Unreleased varieties.

of South Louisiana. C.P. 44-101 is the strongest and most vigorous of the two and has shown a higher degree of resistance to damage from cold weather while standing than has C.P. 44-155. The sucrose content of C.P. 44-155 has been higher than that of C.P. 44-101.

Both C.P. 44-101 and C.P. 44-155 are more susceptible to attacks from the sugar cane moth borer *Diatraea Saccharalis* than most of the commercial varieties they are replacing, and where necessary, commercial control measures for this insect pest are indicated for their successful production.

The variety C.P. 43-47 was released for commercial production in the fall of 1950. Our data indicate that this variety may not be generally adapted throughout the sugar district of South Louisiana. Its best performance has been on the most fertile of the sandy soil types. It has not performed satisfactorily on the heavier soil types. C.P. 43-47, however, is superior to both C.P. 44-101 and C.P. 44-155 from the standpoint of mechanical harvesting. —*E. C. Simon*

Veterinary Science

Anaplasmosis

This project was reactivated in the latter part of 1950. Anaplasmosis continues to be of major importance to the cattle industry of Louisiana. It is one of the few major diseases of livestock in which we do not have a practical test for detection of carriers, nor are we able to effectively treat the clinical cases, nor vaccinate the susceptible animals. Although anaplasmosis has been diagnosed in over 25 states, many of the better breeding stock brought in from other states are susceptible and suffer severe losses. Most of the cases of anaplasmosis are sporadic in nature; however, herd outbreaks still occur with devastating results. An example of this is a herd of 30 high producing dairy cows which had 27 clinical cases with 13 fatalities over a period of five weeks, and another 40 cases in 60 animals with 70 per cent mortality.

There are many phases of this disease that require research. Other Stations are concentrating on the production of a vaccine or the development of an accurate test for carriers. We have concentrated on the drug screening phase in the hope that we will find a drug that will protect the herd owner from the severe losses associated with outbreaks and, if possible, be of value in the treatment of individual cases. Splenectomized calves are used in the initial tests and are followed by adult cows, if warranted.

Chemozine, Aralen Dihydrochloride, and Aureomycin were screened. Chemozine and Aralen Dihydrochloride showed no activity against the *anaplasma marginale* in splenectomized calves. Because of its widespread use in the field, Aralen Dihydrochloride was re-checked in adult cows. Continuous administration of Aralen Dihydrochloride was started in five animals, at least eight days before clinical symptoms. (From our experience, the incubation period is approximately 30 days.) All five suffered severe attacks, two being fatal. We cannot recommend Aralen Dihydrochloride for the treatment of anaplasmosis.

Aureomycin hydrochloride when administered intravenously gave 100 per cent protection in 16 splenectomized calves. This compares with approximately 80 per cent fatalities in 26 untreated cases inoculated from the same source. However, there was some morbidity and anemia where treatment was started after 10 per cent of the erythrocytes were infected, but not as severe as in the untreated control cases. Sub-inoculations from

treated calves failed to show any attenuation of the causative agent.

The preliminary results reported should not be interpreted as an endorsement of aureomycin for the treatment of field cases of anaplasmosis. Tests are now being conducted to assess the value of aureomycin in the treatment of clinical cases.

—James G. Miller, Helen E. Levy, and W. T. Oglesby

Gastro-Intestinal Parasites of Cattle

In previous experiments it was shown that $1\frac{1}{2}$ grams of phenothiazine was effective in stopping egg production of the nodular worm when fed daily for as short a time as six days. The manure of these animals remained free from eggs for from three weeks to three months. In instances where the nodular worm is demonstrated to be the cause of losses, it might be practical, therefore, to feed phenothiazine for a week and discontinue for three or four weeks and then repeat.

Because of the difficulty in mass feedings, of being certain of the exact amount of the drug that each animal obtains, it was thought best to determine the minimum amount of the drug necessary to eliminate egg production. The results of a series of experiments with this object in mind indicate that .5 gram fed daily for 14 days will accomplish this result. It was found that .6 and .7 gram was not sufficient when fed for seven days and that .5 gram was not enough when fed for 12 days. Thus, in giving a small amount of phenothiazine in the feed to reduce the infection around the premises and protect other and especially younger animals, it is necessary that each animal obtain at least .5 gram daily for at least two weeks.

A series of experiments has been carried out to determine the effects of small amounts of phenothiazine on the developing larvae within the calf, during the prepatent period of the infection. It was found that $1\frac{1}{2}$ grams fed daily during the first four weeks of the larval period resulted in some of the animals remaining negative and the other producing a very few eggs only. In the case of the latter animals, egg production was retarded from 10 to 30 days. The same results were obtained when the drug was fed during the second two weeks only of the prepatent period.

These experiments indicate that $1\frac{1}{2}$ grams of phenothiazine when fed daily interferes with the resulting egg production of the developing larvae as well as of the adult worms. In this manner contamination of the pasture, lots and the barn is reduced and the other animals of the herd are protected from losses due to later infections.

Other experiments indicate that 1½ grams of phenothiazine fed daily will not protect animals from symptoms and death resulting from infections with the larvae of the nodular worm that are already on the premises. Calves fed the drug for two weeks beginning with the time of inoculation, developed normal egg production, severe symptoms, and death resulted in the case of two animals. Thus feeding the drug in this manner is not an immediate cure-all for the losses in weight, general poor condition, and deaths in already heavily parasitised herds, but is an aid in the eradication of the disease-producing larvae. —*Roy L. Mayhew*

Substations

Fruit and Truck Experiment Station, Hammond

W. F. WILSON, JR., *Superintendent*

M. J. GIAMALVA, *Asst. Horticulturist*

During the past year additions to the physical plant have materially added to the facilities of this Station. An additional housing unit for labor, an office building, a small greenhouse unit, and lath-house were constructed and placed in use during the year.

The Station program of work was expanded to include the testing of varieties of figs, the Regional sweet corn and lima bean tests, varieties of broccoli and cauliflower, and additional studies of strawberries with emphasis on the fruit rots in the field and in transit.

Strawberry Studies

Variety Test

Marion Bell produced 372 crates per acre in 1951 to lead all of the standard varieties in the test. Klondike ranked second. The Marion Bell has produced higher yields six of the past seven years.



Greenhouse constructed at the Hammond Station during the year.

Counts of the fruits that showed rots from the three standard varieties during this past season showed the following variation between varieties: Marion Bell, 14 per cent; Klonmore, 22 per cent; and Klondike, 26 per cent.

Spraying the varieties Marion Bell and Klonmore with Fer-mate at weekly intervals from January until harvest did not make any significant difference in the rotting of fruit or in total yields.

Chemical Weed Control

Pre-setting sprays of 2,4-D at the rate of 2 pounds acid equivalent per acre continued to be effective for the control of weeds in strawberries. The past three seasons a reduction of 40 per cent in the number of weeds has been effected, as well as a marked reduction in the size of these weeds at the time of scraping. The labor involved in scraping sprayed areas is reduced 60 per cent as compared with the amount required for unsprayed areas. The use of this pre-setting spray and the spraying of the middles at the time of scraping have also produced a slight increase in yield. Spraying the middles eliminates chopping during the harvest season.

Fertilizer Test with Strawberries

During the seasons 1949, 1950, and 1951, on soils regularly planted to strawberries, and on soils that have not been planted to strawberries for several years, a test was conducted involving the application of 1,500 pounds of the formulas 4-4-4, 4-8-4, 4-12-4 and 4-16-4 per acre. For the three-year period, all the ratios show a significant increase in yields over the 4-4-4, but there were no great differences in yield for the other ratios over the 4-8-4.

Strawberry Plant Fertilizer Test

During the plant producing season of 1951 a test involving 10 fertilizer treatments and a control was conducted. These fertilizers were applied as a side-dressing at the rate of 500 pounds per acre—250 pounds applied August 1 and 250 pounds September 25. The plants were harvested and counted November 15. Highest yields were recorded from the plots on which the formula 4-12-4 was used. There was a large increase in plant production when the nitrogen content of the formula was increased from 0 to 4 per cent. No increase was found beyond 4 per cent. Increases were also obtained from additional phosphorous up to 12 per cent of the formula. More large plants were obtained from the high-phosphorous plots. These plants have been set out and fruit yields will be taken.

Strawberry Top-dressing Tests

Top-dressing tests have been conducted through the seasons 1945 to 1951. During the seven-year period best yields were obtained from the application of 750 pounds of the formula 4-12-4 in the beds before planting and 750 pounds as a top-dressing at the time of scraping and mulching. There was no increase in yield from the addition of nitrogen as a top-dressing. Application of 1500 pounds of 4-12-4 before planting produced 221.5 crates per acre, while the split application produced 235. During the same period application of 500 pounds under and 500 pounds as a top-dressing produced an average yield of 225 crates per acre.

Tung Meal as a Strawberry Fertilizer

During the 1950 and 1951 seasons, tung meal was tested in comparison with cottonseed meal as a source of nitrogen for strawberries. These materials are compared on the basis of pound for pound of the material and pound for pound of nitrogen when incorporated in the formula 4-12-4. Yields of 175, 171 and 175 crates per acre were obtained from tung meal compared pound for pound of material, and tung meal compared pound for pound of nitrogen with cottonseed meal respectively. Cottonseed meal costs approximately three times as much per ton as tung meal; these results indicate therefore that a relatively cheap source of a similar fertilizer material is available to growers. Because of the long standing practice of using cottonseed meal, these results have been of much interest and value to strawberry growers.

Strawberry Breeding

As part of the breeding program with strawberries carried on with Dr. J. C. Miller, a few plants each of a number of seedlings are grown each year for observation and selection. Any seedlings deemed worthy of further trial are increased to be grown in comparison with the standard varieties. At the end of the fruiting season this year, 11,000 L-27 plants were distributed to growers to observe their success with this seedling and their reaction toward it. This seedling has produced very high yields but very few plants.

Cucumber Studies

Fall Cucumber Fertilizer Test

In the fall of 1950 and 1951, nine treatments were used involving variations in the combinations of the three major elements. The amount of each varied from 32 to 96 pounds. Yields were depressed by the addition of nitrogen above the minimum

amount of 32 pounds per acre and increased by the addition of phosphorous above 64 pounds per acre.

Fall Cucumber Variety Test

In the fall of 1950, the highest yielding cucumber adapted for commercial use was Marketer. Palmetto, a new variety which has received quite a bit of attention, is resistant to mildew and produces uniform yields; however, it is a blunt-end cucumber and many of the fruits have holes at the points of seed attachment, which makes it objectionable as a market cucumber.

Several other varieties which have been in the regional variety test have produced good yields, have good market qualities, and are resistant to mildew.

Irish Potato Variety Test

In tests conducted for the past several years, the new variety LaSoda, although not producing significantly higher yields than Triumph, had a smoother and brighter colored skin. These qualities make it more desirable for commercial production.

Sweet Potato Variety Test

In 1950 and 1951, Heartogold was the highest producing potato for early and for regular season production. Both Heartogold and L-240 produced yields far above Unit I and Gold Rush. Both of these potatoes have objectionable market qualities, Heartogold a white skin, and L-240 low storage quality. Heartogold can be used as the home garden potato in this area, or both may be grown as an early market potato.

Sweet Corn Variety Test

A sweet corn regional test was conducted in 1951. Yields of 1217, 1078, and 1037 dozen ears per acre were harvested from Golden Security, Parade and Iochief, respectively. These varieties were from two to five days earlier and produced higher yields than Golden Cross Bantam, which was used as a control. Calumet, Oto, and Aristigold Bantam Evergreen produced lower yields than the check but were of better quality and had a better general appearance.

North Louisiana Experiment Station, Calhoun

RALPH S. WOODWARD, *Superintendent*

JOHN C. TAYLOR, *Assistant Horticulturist*

J. L. HEATH, JR., *Research Associate in Animal Industry*

A. V. DAVIS, *Research Associate in Animal Industry*

Agronomy Research

Corn Fertilizer Tests — 9 Year Summary

This experiment was begun in 1942 and was based on general fertilizer usage at that time. In 1946 the rate of fertilizer was increased in keeping with the trend of higher corn fertilization. The plots remained the same, so that the study covers a nine-year period. Based on data collected over this period 1942-1945, a 50-24-24 led the test at 42.6 bushels per acre, followed in order by 50-24-50 at 41.5; 34-0-24 at 36.8, and 34-0-0 at 36.5 bushels per acre. The four-year average for the no-fertilizer plots was 13.4 bushels per acre. In 1946 all plots received additional plant food, and the data collected for the five years 1946-1950, are: a 90-30-30 led this series with 48.2 bushels per acre, followed by a 90-30-60 at 47.1; 60-30-60 at 43.9; 60-30-0 at 43.5, and a 60-30-30 at 43.2 bushels per acre.

It is interesting to compare the yields of the two periods of study and note the very slight difference in yield from the two levels of fertility. Another interesting fact is the comparatively high yield recorded by treatments 9 and 10 which received no phosphorous throughout the period. One plot received a 34-0-24 and a 60-0-30 while the other had a 34-0-50 and 60-0-60 for respective yields of 36.8 and 39.4 for the former and 34.5 and 37.1 for the latter.

In 1951 the plots were kept intact and the treatments were varied, as shown in the table below, in order to determine the

Five-Year Treatment		1951 Treatment and Bushels per Acre	
Average Yield in Bushels per Acre			
No fertilizer	8.1	60-30-30	35.3
30-0-0	27.6	30-30-30	21.8
60-0-0	39.0	0-30-30	8.5
30-30-30	30.7	30-0-0	19.8
60-30-30	43.2	No Fertilizer	10.3
90-30-30	48.2	" "	15.8
60-30-60	43.9	" "	13.7
90-30-60	47.1	" "	14.2
60-0-30	39.4	0-30-0	9.2
60-0-60	37.1	0-30-0	9.2
60-30-0	43.5	0-0-30	7.8

residual effect of a fertilizer program. Using a 60-30-30 as an optimum amount, plots were fertilized so that the 1951 application supplied those materials missing from the old fertilizer treatments.

There was no cover crop used during the period of the fertilizer test. The soil on which this test is located is a well drained sandy loam of a type found generally throughout the hill area.

Results are given in the table on Page 142.

Corn Fertilizer and Spacing Experiments

One experiment was begun in 1947 to test the effect of plant population and rate of fertilization on yields of hybrid corn. Three hill spacings were used, 18, 24, and 30 inches, with corn thinned to one plant per hill and planted in 40-inch rows. The fertilizer treatments were varied in replicated blocks from no fertilizer to a complete analysis, including up to 120 pounds nitrogen alone and also to test the effect of phosphorus and potash.

Three years' results of the original test show very little difference in yield from the various hill spacings, with highest yields being produced by 24-inch spacing, both in bushels per acre and ear development. The closer spacings produced a higher percentage of small, faulty ears, but in 1949, a year of good rainfall for corn production, the 18-inch spacing also had a good ear development.

In 1950 the 30-inch spacing was changed to 12 inches in order to check further into the effect of close planting under good fertility. Results of the past two years show that even a smaller ear can be expected with a high percentage of poorly developed ears at the 12-inch spacing. Increase in yields over the 18-inch spacing were of no significant difference. There was very little difference in yield from the various fertilizers after the 60 pound level of nitrogen was passed, whether used alone or as a complete fertilizer. Slight increases in yield at all spacings occurred from 90 pounds of nitrogen but the yield was not enough to justify the added expense, especially when the nitrogen was increased to 120 pounds per acre. Results to date indicate that under average hill land conditions 24-inch spacing is probably the most satisfactory on upland soils, with 60 pounds of nitrogen per acre. However, if good, moist bottom land is available 18-inch spacing and a higher level of nitrogen will probably prove profitable.

Another experiment begun in 1950 to examine the method of obtaining various plant populations and their effect on yields of corn under a high level of fertility was continued in 1951. The results of the first two years show that there is but little difference in the method of arriving at a given number of plants per

acre. One plant per hill at 12-inch spacing averaged 67.1 bushels per acre; two plants at 24-inch spacing averaged 69.6, and three plants at 36-inch spacing averaged 69.3 bushels per acre. One plant per hill at 18-inch spacing averaged 69.7 bushels per acre and two plants at 36 inches averaged 70.2. These are compared to one plant at 24 inches, which produced 66.3 bushels per acre. The fertilizer used both years was 120-64-64 which was supplied by a commercial 6-8-8 plus nitrate of soda.

Corn, Soybean Experiment

This experiment was begun in 1949 to examine the effect of interplanting corn with soybeans as compared to corn alone. Two methods were used, planting alternate rows, and alternate hills of corn and beans. The experiment was designed to test the effect of annual planting as described above and also to test the effect of a two-year rotation using cotton following corn alone and also following the corn and beans in both systems. The average production for the three years was as follows: corn alone, 56.3 bushels per acre; corn and beans in alternate hills, 53.2 bushels per acre; corn and beans in alternate rows, 36.3 bushels per acre.

Variety Tests with Cotton and Corn

In 1951 the work of testing commercial varieties and hybrids of these two major crops was continued. The results of these tests do not vary greatly from past years. In the corn test the five leading varieties, with the yield in bushels per acre, were as follows: Dixie 22, 60.5; Dixie 11, 59.2; Dixie 18, 56.8; La. 0015, 56.2; and La. 521, 55.7.

The leading cotton varieties, with the yields in lint cotton per acre, were: Delfos 9196, 682 pounds; Early Fluff, 623 pounds; Paula 40, 621 pounds; Deltapine 15, 603 pounds; and Smith 78, 592 pounds. —*Ralph S. Woodward, H. W. Ivy, and F. W. Self*

Pasture Studies

Crimson Clover—In order to determine how to manage this crop there was no reseeding done in the fall of 1950, which was characterized by frequent light rains in September followed by a prolonged drought in October. Good stands were observed in all pastures as early as mid, to late, September but severe killing resulted from the hot dry weather of October. It was observed that on relatively bare soil and thin sod the killing from drought was more severe than under conditions where there was enough cover to protect the young seedlings. As mentioned in a previous report, too dense a cover results in a dieback of the seedlings which under some conditions is just as severe as from no cover. It was also observed in one 10-acre pasture that reseeding was

materially reduced by overgrazing late in the spring and this, together with the effect of the dry conditions, resulted in a very poor stand.

Subterranean Clover—While apparently not as good as crimson, subterranean clover continues to produce good forage from the original planting. It was damaged less by excessive grazing and produced a good crop in 1951 in spite of the fall drought. The most outstanding pasture in 1951 was the combination planting of crimson-subterranean which was made in the fall of 1949.

Fescue Grass—After three years of work with fescue the following points are evident, based on conditions on this Station:

a. Fescue will not compete favorably with crimson clover under normal conditions of fertility.

b. It requires a high level of fertility, especially nitrogen.

c. It apparently requires more moisture than is generally available on upper hill land pasture.

d. It is easily overgrazed, especially when interplanted with clovers and during its first year.

e. Because of the high cost of fertilizer and the large amounts required by fescue, it is doubtful if it will prove economical on any but the better bottom land pastures in the hill section.

Alfalfa—Four acres of dairy pasture were devoted to this crop in the past. The old stand was plowed up and the soil thoroughly prepared and fertilized in the fall of 1949 using 1,000 pounds dolomitic lime, 300 pounds 3-12-12 plus 100 pounds 60 per cent muriate of potash, per acre. It was sown to common alfalfa at the rate of 40 pounds per acre. In the fall of 1950 this plot again received 400 pounds 3-12-12 plus 100 pounds 60 per cent muriate of potash per acre. After the first cutting in 1951 the plot received 300 pounds 6-8-8 per acre plus 40 pounds of borax. Production from the above was as follows: 1950—A total of 230 bales of hay plus 150 cow-days grazing; 1951—A total of 234 bales of hay plus 100 cow-days grazing. (Milk production from the 1951 grazing is listed under the dairy report.) —*Ralph S. Woodward*

1951 Grazing Trials

Grazing trials in 1951 with the Devon herd and with the Africander-Angus herd gave only moderate gains as compared to past years. One 13-acre pasture of bermuda grass and voluntary crimson clover (with 4½ acres that failed to reseed due to the drought) produced 1,645 pounds of gain between March 16 and April 30. The cattle were kept on this pasture during the summer but no further weights were taken.

Additional grazing trials using the Africander-Angus herd of 28 cows and calves produced gains as follows: March 16-April

30—10 acres of crimson-fescue-carpet grass and 10 acres of subterranean-fescue-carpet grass produced 1,465 pounds of gain; May 1-June 7—15 acres of native bermuda produced 1,600 pounds of gain. —*Ralph S. Woodward and J. L. Heath, Jr.*

Animal Industry

Beef Cattle

The calf crop from the Devon X Africander-Angus cross was 10 calves from the Africander-Angus cows and seven from the Devon cows. Average weight at two weeks age for the calves from Africander-Angus cows was 88.5 pounds and that for the calves from the Devon cows was 110 pounds. This is quite a bit heavier than the Africander-Angus calves of 1950, which averaged 78.1 pounds at the same age. These calves were raised on their mothers on open pasture and weighed at regular intervals throughout the season. These weights show no significant difference between the two groups, and final weights were about even. Although the weights of these calves show them to be about equal in development, the calves from the Devon cross have a deep red color and better body conformation than the 1950 crop of Africander-Angus calves. It is interesting to note that the polled characteristic of the Africander-Angus was transmitted to all females while the males retained the horns of the Devon.

On December 8, 1951, three heifers and four steers from each of the above mentioned groups of calves (a total of 14 calves) were placed in a feed lot to be fed out for market. At this time the group of calves from the Devon cows weighed 2,830 pounds and



Half Devon—half Africander-Angus calves on feeding trial at Calhoun.

the calves from the Africander-Angus cows weighed 2,810 pounds. Weights were taken every two weeks, and at the end of four weeks on feed, the Devon group weighed 3,070 pounds and the Africander group weighed 3,000 pounds. The feeding will continue until the middle of April, 1952, at which time a complete report can be made.

In early September the large Africander-Angus herd bull had to be killed because of paralysis of the rear quarters. A post-mortem examination showed a growth on the spine which was evidently exerting a pressure on the spinal cord. The bull's sire, one of the imported animals used in the original crosses, developed the same trouble and was destroyed several years ago.

Dairy

In 1951 the dairy herd consisted of 15 mature cows and 12 heifers. From these 15 cows there were 5 heifer calves raised. An average of 7 cows were milked during the year and produced a total of 67,726.7 pounds of milk. The herd ration for the year consisted of one part cottonseed meal and three parts of crushed corn, with salt and cattle minerals added. There has been considerable breeding difficulty in the herd during the last few years. Steps are being taken to determine the cause of this and to eliminate the cause if possible.

The only research that was done during the year was the grazing of certain pasture crops to determine their grazing capacities. The crops used were Texas Common alfalfa, on which an average of 27.7 pounds of milk was produced per day, per cow; mixed clover and fescue grass produced 27.4 pounds per day, and oats and vetch produced 26.6 pounds per day. The grazing dates were from March 7 through April 10. During these grazing trials the herd ration was being fed at the rate of one pound of the ration to four pounds of milk.

An expanded program of dairy research is planned for the coming year. —A. V. Davis and Ralph S. Woodward

Swine

Comparison of Two Swine Breeding Systems—The swine breeding experiment will provide a direct comparison of a three-way cross with a pure breeding system. The pure breeding herd will consist of a pure line of Duroc-Jerseys. The three-way cross was started by mating of Landrace Large Black boar to Duroc-Jersey females of the same breeding as those in the pure breeding herd. The following year females from this cross will be mated to a selected Hampshire boar. The female progeny of this cross will be mated to a Duroc-Jersey boar and then the cycle will be repeated.

In the first stage of the breeding program three Duroc-Jersey sows were mated to Landrace Large Black boar and two Duroc-

Jersey sows were bred to a pure Duroc-Jersey boar. The three sows bred to Landrace boar farrowed 29 pigs that averaged 2.6 pounds per pig at birth; at the end of eight weeks the average weight per pig was 28.7 pounds. The two pure bred Duroc sows farrowed 23 pigs that averaged 3.0 pounds at birth; at the end of eight weeks the average weight was 37.8 pounds per pig. When sold the average weight for pure Duroc-Jersey pigs was 305 pounds, and Duroc-Jersey and Landrace average weight was 210 pounds.

Three gilts from the Landrace and Duroc-Jersey and three gilts from the pure Duroc-Jersey were saved to mate and farrow in March, 1952, to continue the comparison of the two swine breeding systems.

Cost of Producing Feeder Pigs—Preliminary test, using 18 pure Duroc pigs and 22 Duroc and Landrace crosses, shows that pigs can be grown cheaper, through eight weeks of age, than they can be purchased on local markets.

The 5 brood sows and 40 pigs consumed 4,622 pounds of feed during the eight weeks on test. The total feed cost of raising 40 pigs to eight weeks was \$200.13, or \$5.00 per pig. The same type of high quality feeder pigs were selling on the local market for \$10 to \$14 per pig. The pigs at eight weeks of age averaged 32.3 pounds.

The 40 pigs consumed 5,000 pounds of feed from eight weeks of age until they were put on sweet corn to graze on July 10, 1951. The average weight of pigs at end of feeding trial was 92 pounds. Average feed cost from eight weeks to end of feeding period was \$5.80 per head. The same quality of feeder pigs were selling on local markets for \$20 to \$22 per head. The total feed cost was \$10.80 per head from day old until grazing sweet corn in the field. These results are not conclusive, since they represent only one year's work.

Hogging Off Crops—The "Hogging off" program was continued in 1951 grazing Gulf Coast sweet corn, Missouri Hybrid 313, Louisiana Hybrid 468 interplanted with Pelican soybeans, and alfalfa and vetch (interplanted) as winter and spring grazing crops.

All of the spring pigs and sows grazed alfalfa and oats, interplanted, until July 10, at which time 37 pigs averaging 92 pounds were put on one acre of Gulf Coast sweet corn. In 13 days, July 10-24, the sweet corn produced 345 pounds of pork gain.

On July 23 all of the pigs, averaging 101 pounds, were put on one acre of Missouri Hybrid 313, and in 15 days (July 23-Aug. 7) made a pork gain of 785 pounds. Average weight of the pigs was 122 pounds.

A producer who raises feeder pigs may well consider the use of Missouri Hybrid 313 to graze early and to put a quick, economical gain on his pigs. Two years results' show that Missouri Hybrid 313 produced more pork per acre than sweet corn and is ready to graze at about the same time.

The feeder pigs were dry lot fed from August 7 to September 11, because of the late maturity of the field corn and soybeans. All of the barrows were removed from the herd and 15 females averaging 150 pounds were put on 3 acres of Louisiana Hybrid 468 and Pelican soybeans interplanted. In 48 days (Sept. 11-Oct. 29) the pigs made a gain of 1,180 pounds.

—*J. L. Heath, Jr., C. B. Singletary, and Ralph S. Woodward*

Horticulture

Irish Potato Varieties

Four standard varieties and two advanced seedlings were studied. The LaSoda made significantly greater yields of marketable tubers than any other variety, producing 137.3 bushels per acre. Kennebec, the only white variety tested, was second with a yield of 84.5 bushels of marketable tubers per acre. Yields were reduced considerably by the very dry weather which prevailed throughout the latter part of the growing season. Recommended red varieties for production in North Louisiana are the LaSoda and Triumph. Recommended white varieties are Katahdin and Kennebec.

Sweet Corn Earworm Control

Both 5 and 10 per cent DDT dust were used as the insecticide and each rate was applied in the following manner: (1) at two-day intervals beginning just prior to silking and continuing for six applications, (2) at two-day intervals beginning when 25 per cent of silks had appeared and continuing through six applications, and (3) at three-day intervals beginning just prior to silking and continuing for four applications. The 10 per cent DDT dust applied at two-day intervals beginning just prior to silking and continuing through six applications, gave the best control with 61.1 per cent worm free ears as compared to only 1.1 per cent worm free ears from the check plots. In all cases the 10 per cent DDT gave better control than the 5 per cent DDT. Results of these studies indicate that in order to get best control of the corn ear worm in North Louisiana a 10 per cent DDT must be applied just prior to silking and continued at two-day intervals until harvest time.

Sweet Potato Varieties

This test included five named varieties of sweet potatoes and seven advanced seedlings. The Heartogold variety was first in

production with a yield of 238 bushels of marketable potatoes, followed by Goldrush (L-241) with 208 bushels, while Porto Rico, the old standard variety, produced only 144 bushels. In addition to its high yield the Goldrush is also a wilt resistant variety. The Heartogold, while making high yields of excellent quality, has a cream colored skin and is not generally accepted by commercial buyers who prefer potatoes with a color similar to the Porto Rico. The Goldrush has such a color and, with Porto Rico, is recommended for commercial production in North Louisiana.

Shallot Work

Approximately one quarter of an acre of shallots produced 1,217 pounds of dry bulbs. This yield was produced during one of the most severe winters on record in North Louisiana. The tops of the plants were damaged considerably by the -5 degree temperature of February 2, but not to the extent that they were unable to recover well enough to produce good yields. Several individual hill selections were made from this crop and are being grown for further testing.

Strawberries

A small plot of the seedling 7-24 was grown along with a few plants each of several other varieties and seedlings. The seedling 7-24 was the most outstanding of the group and produced good yields even though late frosts caused considerable damage.

Tomato Varieties

Fifteen varieties were grown in replicated yield trials. In order to determine both the early and total yield, the yields were computed through July 11, when most of the early varieties had finished producing, and then again when all varieties had completed production. In early production, Stokes Cross No. 2, Stoke-dale, Early Wonder, and Gem were the leading varieties with production of approximately 7,000 pounds of marketable fruit per acre. Stokedale was also the leading variety in total yield with a production of 12,802 pounds per acre. These results, however, are for one year only and until further study can be made the recommended varieties for production in North Louisiana are the Rutgers, Marglobe, and Gulf State.

Watermelon Breeding

A number of seedlings were grown and observed on wilt infested soils. Several crosses were produced involving parents which possess wilt resistance as well as other desirable characters. The advanced seedling QX 124 was grown in an outfield fertilizer test on soil which is heavily infested with the wilt organism and not one hill was lost due to the wilt disease. This seedling was named

Calhoun Sweet and has been released for commercial production. In 1951 this variety produced 1,252 melons per acre with an average weight of 26.9 pounds per melon. Only those melons weighing 20 pounds or more were counted.

Watermelon Fertilizers

The commercial producers of watermelons have no standard practice in fertilization and for the most part use small amounts of the various standard analyses. In order to determine the value of the ratio and amount of fertilizer, a test was conducted using various amounts of three of our more common fertilizers, namely, 5-10-5, 6-8-8 and 8-8-8, along with different nitrogen carriers as side-dressings. The results of this one year's work indicate that watermelons should be given at least 600 pounds of a high grade fertilizer per acre plus 100-150 pounds of nitrate of soda or the equivalent as a side-dressing.

Orchard Management Test

The third year of this work has just been completed but no yield records have been taken. However, growth measurements made each year show that young peach trees make maximum growth when clean tilled throughout the summer months. There has been no difference in growth measurements from those plots growing winter cover crops, followed by clean tillage throughout the summer, and the plots which received a complete fertilizer and clean tillage all year. However, in those plots which produced a cash crop during the spring or a summer crop of crotalaria, the growth measurements have been less than those from plots receiving fertilizer alone.

Peach Insects

DDT was again used for control of the peach tree root borer and the oriental fruit moth and, based on the results of the past four years, is recommended for the control of these two insects.

The Parathion treatment as described in the 1950 report was again used for lesser borer control with very favorable results. This material was applied three times during the growing season, the first treatment being applied in early June followed by a second in mid-July and a third in mid-September. However, in all probability, the first application should have been made in early May, since the first heavy brood appeared at that time. This material is more effective in controlling the insect when the temperatures are about 80° F. at the time of application and for the following 72 hours. Periodic checks throughout the winter months of 1951-52 show that this insect is active and apparently reproducing at that time, as well as during the summer months. This is especially so during mild winters.

Peach Varieties

The yields of most varieties were low during the 1951 season, because of the -5° temperature of February 2. However, the fruit buds of some varieties withstood this unusually low temperature and produced a normal crop. Table 1 is a four-year summary of production of 24 varieties. During this period only the 1948 season can be considered as an ideal peach season. Both the 1949 and 1950 seasons were preceded by very mild winters, while the winter preceding the 1951 season was one of the most severe that this area has had in many years. The 1949-50 yields give some indication of the varieties which require little chilling. Those varieties which produced good yields during those years in general, require near the minimum of chilling. During the winter preceding the 1949 peach season this Station only had approximately 1,021 hours of temperatures at or below 45 degrees throughout the winter, with approximately 861 hours of this being accumulated by February 15. The following winter this figure was even smaller, being approximately 969 hours, with an accumulation of approximately 775 hours by February 15. February 15 is generally accepted as being the latest date that low temperatures affect the dormancy in peaches. Taking into consideration the above facts, it is very evident that the yields shown in Table 1 are not truly representative of those expected over a four-year period, because it is doubtful that North Louisiana has ever before experienced three consecutive winters so adverse to peach production as the past three have been.

The following varieties are recommended for commercial peach production in North Louisiana and are listed in order of ripening: Dixired and Dixigem followed by a choice of Sunhigh, Southern Glow and Triogem, followed by Summercrest, Burbank Elberta, and Elberta. These same varieties plus Raritan Rose, Golden Jubilee, and Georgia Belle should be used for home orchards. The Raritan Rose and Georgia Belle varieties have white flesh and will not sell commercially for that reason. Golden Jubilee has yellow flesh but is a very poor shipper.

—*John C. Taylor and Ralph S. Woodward*

Four-Year Summary of Peach Varieties

Variety	Average Date Picking	Shipping Qualities**	Flesh Character-istics*	YIELDS				Fruit bud readings per cent killed by Feb. 2, 1951.	Yield Rating over 4-year period
				1948**	1949**	1950**	1951**		
Dixired	May 28	3	YSC	3	5	6	3	10	4.25
Early Red Fre	June 5	4	WSC	3	5	6	5	95	4.75
Early Halehaven	" 12	5	YSC	5	4	6	4	90	4.75
Dixiegem	" 8	2	YF	4	3	6	4	80	4.25
Golden Jubilee	" 17	6	YF	4	1	3	4	25	3.00
Red Haven	" 15	3	YF	2	6	6	3	35	4.25
Raritan Rose	" 16	5	WF	1	1	3	3	50	2.00
Sun High	" 22	2	YF	1	1	2	4	50	2.00
Southern Glow	" 21	1	YF	1	1	2	4	50	2.00
Triogem	" 22	1	YF	2	3	6	3	65	3.50
Summercrest	" 24	3	YF	2	1	3	3	75	2.25
Burbank Elberta	" 26	4	YF	3	1	2	3	70	2.25
Golden Globe	" 26	5	YF	6	6	6	5	95	5.75
Halehaven	" 25	4	YF	4	4	6	4	60	4.50
Colora	" 29	6	YF	2	3	6	1	15	3.00
Goldeneast	" 29	3	YF	4	4	6	3	65	4.25
Gleasons Early Elberta	July 7	2	YF	2	4	6	4	75	4.00
Georgia Belle	" 11	5	WF	5	1	3	2	25	2.75
Sullivans Early Elberta	" 6	2	YF	2	3	6	5	90	4.00
Elberta	" 11	2	YF	2	3	6	5	90	4.00
Afterglow	" 26	2	YF	5	3	6	5	95	4.75
Rio Osa Gem	" 27	5	YF	4	5	6	5	95	5.00
Frank	Aug. 10	1	YC	3	3	3	3	60	3.00
Lizzie	" 9	"	YF	3	1	3	2	20	2.25

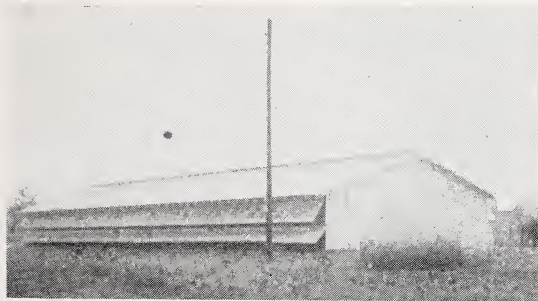
**1 - Excellent
 2 - Very good.
 3 - Good
 4 - Fair
 5 - Poor
 6 - Very poor

*YSC - Yellow Semi-cling
 WSC - White Semi-cling
 YF - Yellow free
 WF - White free
 YC - Yellow cling

Poultry

Commercial Broiler Experiments

In the past two years production of commercial broilers in North Louisiana has developed into a \$2,000,000 industry. This new agricultural enterprise is located in three or four parishes, with the greater portion in the Ruston area of Lincoln Parish. In

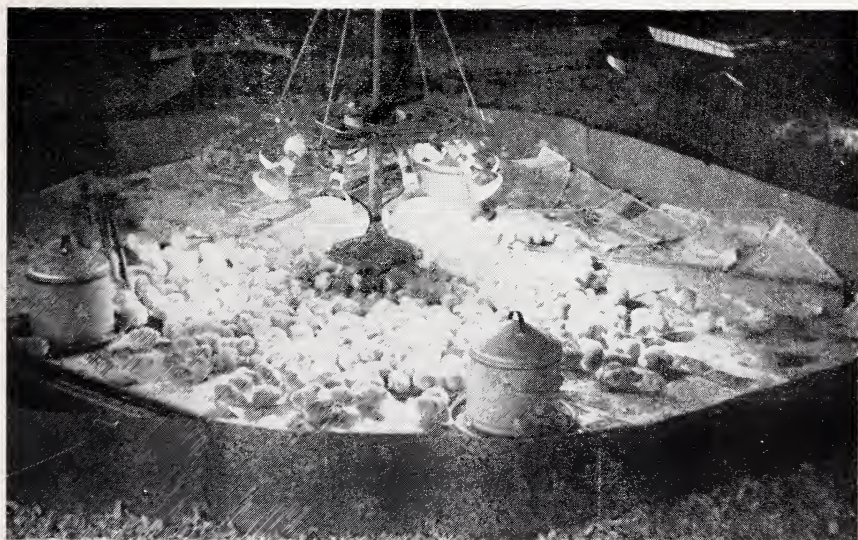


Three thousand-bird capacity experimental broiler house added at the Calhoun Station during the year.

groups of broilers have been produced to date.

Late Summer Broiler Trial, July 5 - Sept. 12—A single test was conducted (involving in three lots, a total of 2,646) of sum-

order to keep abreast of the demand for information along this new line of endeavor, a 30 feet by 90 feet broiler house was constructed on this Station in June, 1951. This house was designed along the lines of the better houses in the Ruston area but modified to meet research needs. Two



Experimental type infra-red brooder built by Station personnel in an effort to reduce the cost of this type of chick brooding. It has eight 125-watt infra-red bulbs controlled by two separate thermostats. Note the shield at the bottom (near chick height) to prevent heat rays from affecting thermostats. There are 500 chicks under this brooder. Note the even distribution of chicks, with no crowding.

mer grown meat type New Hampshire broilers. One group was grown under natural light, another under all-night lights and a third had intermittent night lights (lights on thirty minutes and off two hours through the night).

On the basis of this one ten-week test the extra light, at night, did not produce additional growth. The three lots averaged 2.76, 2.74, and 2.73 pounds, respectively. Since the all-night light and the intermittent night light groups consumed about one-half pound more feed per bird, the feed efficiency in these two groups was not as good as for the chicks with natural light. These results are contrary to the general belief of many broiler growers.

The weights obtained were slightly above average for summer grown broilers in this section of the state. The margin of income over the cost of feed and chicks was 19 cents per chick for all groups, when based on the number started in the brooders. The livability (97.9 per cent) was exceptionally good, with little difference in mortality for the three groups.

Fall Broiler Trial, Nov. 4 - Jan. 13—A second test, with meat type New Hampshire broilers, was concluded on January 13, 1952. Three thousand and seventy-eight broilers were started under six brooders of various types. The lighting conditions of



View of broilers at 8 weeks of age. Automatic waterer (water fountain) is located in center of brooder house by using garden hose attached to underground pipe system. Butane brooder is seen suspended out of the way at upper left. Small portion of automatic feeder can be seen in background

the first trial were tested again. The average weight of the group on all-night lights was 3.43 pounds with 2.85 pounds of feed required to produce a pound of chicken. The group on intermittent light averaged 3.26 pounds with a feed efficiency of 2.75, while the group with natural light averaged 3.29 with 2.80 pounds of feed consumed per pound of gain. The margin of income per chick over cost of feed and cost of chicks averaged 28.3 cents. When the charges for lighting are considered there is very little difference in the net margin for the three groups.

The livability of all groups was satisfactory, with 95.7 per cent of all chicks placed in the house marketed. The fuel cost per chick for brooders of different types was as follows: electric canopy, 1.34 cents; electric infra-red (new type), 2.45 cents; infra-red (old type) 3.6 cents; butane gas closed canopy, .7 cents; butane open canopy, two brooders, 1.05 and 1.07 cents. The fuel costs for the summer trial were appreciably less (.61 to 1.8 cents), particularly for the electric brooders.

—J. L. Heath, Jr., C. W. Upp, and Ralph S. Woodward

Hens Versus Pullets

This is the third and final year of this experiment which had as its purpose the determination of the relative profit that may be expected from an old-hen flock as compared to pullets in the first year of production. In the first year of the test (1948-49) the pullets made a profit of \$1.60 each as compared to a loss of \$1.06 per hen in the old-hen flock. In the second year (1949-50) the pullets had a 89-cent margin of profit as compared to a net deficit of 14 cents per hen.

In the third year two pens of egg type New Hampshire layers, one containing 100 pullets and another containing 100 old hens, were housed in separate pens and given the same diet of laying mash and grain fed *ad libitum*. Culling was not practiced in either pen.

The pullets (over a 40-week period) each consumed 84.14 pounds of feed for the entire period, or 8.41 per four-week period. The consumption of feed (over a 45-week period) for the hens was 86.63 pounds, or 7.22 pounds per four-week period.

For the third consecutive year, the eggs of the pullets hatched much better—90.2 per cent of all eggs set—while 81.3 per cent of those from the old hens hatched.

The pullets averaged 150 eggs valued at \$4.97, while the feed cost per bird was \$3.58. The old hens averaged 95 eggs valued at \$3.13 while the feed cost per bird was \$3.68. The pullets have laid more eggs per year (valued at \$1.78) than the hens. The net income has been in favor of the pullet flock by an average of 91 cents per pullet. The old hens have each year yielded a net deficit averaging 62 cents for the three-year period. Indications are that farm flocks kept for "market eggs" and for "hatching eggs" should be sold each summer and replaced with 100 per cent pullets for the new laying year. —J. L. Heath, Jr., H. E. Hathaway, C. W. Upp, and Ralph S. Woodward

The Beltsville White Versus Broad Breasted Bronze Turkey

In the seventh year of turkey production on this Station a comparison of the two breeds indicates some advantages for each. The large Broad Breasted Bronze and the small Beltsville White

turkeys were compared as to growth rate or size, feed consumption, and dressing percentages.

The Broad Breasted Bronze males averaged 24.3 pounds and the females 14.2 pounds when marketed at seven months of age, while the Beltsville White males averaged 13.5 pounds and the females 8.2 pounds at five and one half months of age. The Beltsville Whites normally are about a month younger than the Bronze when marketed.

The mortality was higher this year in both breeds than for any previous year. Mortality after four weeks of age was very low. Average feed consumption based on the number of turkeys marketed was increased some because of higher mortality, but since the poults died at an early age the feed consumed by them was limited. The Beltsville Whites consumed 60.6 pounds of feed per bird marketed. This amounted to 5.6 pounds of feed per pound of turkey produced. The Broad Breasted Bronze consumed 89.0 pounds of feed per turkey marketed. The necessity of replacing poults increased greatly the cost of poults "per turkey marketed" particularly for the Beltsville Whites. This cost averaged \$1.08 for the Broad Breasted Bronze and \$3.28 for the Beltsville Whites. The high cost of poults cut the margin of income over feed and poult cost to \$2.16 per Broad Breasted Bronze turkey and resulted in a loss of \$1.31 per Beltsville White marketed. This is the first year that any group of turkeys has failed to yield a net margin of income. In previous years the net income for the Broad Breasted Bronze has ranged from \$1.75 in 1946 to \$3.52 in 1947, while that of the Beltsville Whites has ranged from \$1.54 in 1949 to \$2.38 in 1948.

The shrinkage in weights due to trucking from Calhoun to Baton Rouge and holding over-night (with water but no feed) ranged from 4.5 per cent for the Bronze hens to 6.7 per cent for the Bronze toms. The two breeds (considering both sexes) averaged the same in shrinkage, 5.6 per cent.

A bulletin summarizing the results of all years is to be published this year.

North Louisiana Hill Farm Experiment Station, Homer

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FRED HATHORN, *Assistant Dairyman*

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Agronomy

Corn Variety-Hybrid Tests

Twenty different hybrids and varieties were compared for yield and quality. The hybrids continued to produce more grain per acre than the open-pollinated varieties. Dixie 22, La. 9017, Funk's G-721, N. C. 27, Funk's G-714A, Dixie 11, Dixie 18, and La. 468 were the top yielders.

—*D. M. Johns, Hugo Stoneberg, and H. W. Ivy*

Corn General Fertilizer Test

A test with stalks spaced 18 inches apart which included fertilizer treatments varying from 45 to 75 pounds of nitrogen per acre and with and without phosphorus and potassium has been conducted two years. The highest average yield has been 51.9 bushels per acre, which resulted from an application of 300 pounds of a 5-10-10 fertilizer per acre before planting and a side-dressing of 60 pounds of nitrogen.

Corn Fertilizer Rate and Depth of Placement Test

Yield data for a period of two years do not indicate any advantage to the placement of fertilizer at depths beyond three or four inches. The fertilizer treatments used were 600 pounds of an 8-8-8 fertilizer before planting and a side-dressing of 50 pounds of nitrogen per acre and 1,200 pounds of an 8-8-8 before planting and a side-dressing of 100 pounds of nitrogen per acre. The plants were spaced 18 inches apart on 40-inch rows. —*D. M. Johns*

Cotton and Corn Fertilizer Placement Test

The results of a one-year test indicate that the placement of fertilizer for cotton about two and one-half to three inches directly below the seed roll at planting time is slightly more effective than placing the fertilizer below and to the side of the seed, the

yield difference being slightly over 100 pounds of seed cotton per acre. The yield of corn did not seem to be influenced by the placement of the fertilizer. However, care should be taken not to place fertilizer too near the seed. The fertilizer used was an 8-8-8 at the rate of 600 pounds per acre for cotton and 400 pounds for corn.

—*D. M. Johns and M. B. Sturgis*

Minor Elements Benefits from Lignite in Mixed Fertilizers for Cotton and Corn

Some 15 fertilizer mixtures that contained lignite have been included in experiments on cotton and corn for a period of two years, one objective being to determine the fertilizer value, if any, of the minor elements in lignite. The data collected do not indicate that yield increases may be expected, under local soil conditions, from the minor elements contained in lignite. Other studies of lignite are included in these experiments and will be reported upon at a later date.

—*M. B. Sturgis, J. G. Marshall, and D. M. Johns*

Cotton Variety Test

A test of 20 varieties and strains was conducted. Delfos 9169-3316, Stoneville 2B, Bobshaw 1-A, Stonewilt, and Louisiana 33 were the five leading varieties in production of seed and lint cotton. The lint percentage of these varieties ranged from 34 to 37. Delta-pine 15 ranked ninth in the test and the lint percentage was 37.8.

—*D. M. Johns and F. W. Self*

Cotton Magnesia-Potash Studies

An experiment was begun in 1950 and continued in 1951 to determine the value of magnesium as fertilizer when mixed in varying amounts and applied with an application of 600 pounds of an 8-8-8 fertilizer per acre. Potassium was also varied with different amounts of magnesium. Yield increases for the two-year period ranging from 38 to 112 pounds of seed cotton resulted from the application of 12 to 36 pounds of MgO per acre. The data further indicate that magnesium may substitute for potassium to some extent in the nutrition of the cotton plant or that potassium is used more efficiently in soils more adequately supplied with magnesium than the soil on which this test was conducted.

A more comprehensive experiment than the one just mentioned was begun in 1951 to study the value of different sources of magnesium and nitrogen and varying amounts of magnesium and potassium, when applied with a uniform amount of nitrogen and phosphorus. Wilt and nematodes damaged the cotton to such an extent that the yield data were of no value. However, the test will be located in a new area and continued in 1952. —*D. M. Johns*

Sodium as a Substitute for Potassium in the Nutrition of the Cotton Plant

Yield data have been collected for the fourth year from cotton grown on plots which have been fertilized annually with fertilizers that contained different amounts and sources of sodium and varying amounts of potassium and a uniform amount of nitrogen and phosphorus. The results continue to support the general conclusion that sodium may substitute for potassium to a high degree in the nutrition of the cotton plant or that potassium is used more efficiently by the plant in the presence of a more adequate supply of sodium than was contained in the slightly acid Lakeland fine sandy soil on which this experiment was conducted.

—*J. G. Marshall, D. M. Johns, and M. B. Sturgis*

Effects of Lime, Sulphur and Certain Minor Elements on Cotton Yields

Increases in yield have been obtained two years out of three from the application of 1000 pounds of lime, 320 pounds of sulphur, 5 pounds of borax, and 5 pounds of copper sulphate per acre when applied in addition to 600 pounds of an 8-8-8 fertilizer. A yield response of 415 pounds of seed cotton per acre resulted from the use of these materials in 1951.

—*J. G. Marshall, D. M. Johns, and M. B. Sturgis*

Entomology

Cotton Boll Weevil Control

Toxaphene was applied as a spray, with the first application being applied on three different dates and the number of applications decreasing as the date of beginning was delayed. Eight applications beginning June 21, seven applications beginning July 11, and four applications beginning July 25 resulted in almost the same final yield, which was approximately 700 pounds of seed cotton per acre. Weather conditions during August were favorable for natural control of the boll weevil and unfavorable for heavier fruiting on the plants where the boll weevils had been controlled with earlier applications of poison.

Tobacco Thrips Control on Cotton

In a three-year study, yield increases were obtained from six different varieties for the first time as a result of controlling thrips on seedling cotton with the use of toxaphene applied as a spray at the rate of one pound per acre of the technical material. Deltapine 15 gave some indication of being more susceptible to thrips injury than the other varieties, although significant yield differences between varieties were not obtained.

—*L. D. Newsom and D. M. Johns*

Horticulture

Camellia Variety Observations

Two plants of each of 25 varieties of camellias have been planted to determine what varieties can be grown successfully in North Louisiana. Further records on cold and heat tolerance of the different varieties are being collected.

Rose Variety Observations

The purpose of this test is to determine varieties of roses that can be recommended in the "Hill" area of North Louisiana. Four plants of each of sixteen varieties were planted in February, and eight other varieties were added to the planting in December.

Cowpea Variety Test

Twelve varieties were grown to determine the yield of dry peas for seed purposes. Purple Hull, Speckled and Brown Crowder were the highest producers, with yields of 13.7 and 13.6 bushels per acre. The need for a higher producing variety is apparent from this as well as previous tests.

Green pea yields for market purposes were collected from five varieties. Purple Hull-Running produced 2,908 pounds of green peas per acre for the highest yield.

Sweet Corn Variety Studies

Yield data were collected for 20 sweet corn varieties. Tri-State was the highest producing variety, making a total yield of 7,280 pounds, or 1,252 dozen ears. Aristogold Bantam Evergreen ranked second, with production practically the same as for Tri-State.

Pole Lima Bean Variety and New Strains Test

Dry weather reduced the yield this season, and no beans were harvested after July. Under these conditions yields ranged from 3,895 pounds per acre for Florida Speckled Pole to 1,301 pounds for L-1-1.

Southern Cooperative Watermelon Trials

Eighteen varieties were included in the 1951 trials. Dixie Queen W. R. and Black Diamond continued to lead in the production of high quality market melons. Icebox varieties, such as New Hampshire Midget, were promising in this test and will be investigated further.

Okra Variety Studies

Okra varieties, including Louisiana Green Velvet, Hammond Station No. 2, Gold Coast, Campbell Soup No. 22, Louisiana

Market, and NPGR-1-M, were planted in replicated plots to determine comparative yields. The entire lot were killed by nematodes when the plants were approximately six inches in height. Further work with okra is needed to develop a nematode resistant variety for the sandy areas of North Louisiana.

Cold Injury to Young Tung Trees in Northern Louisiana

A tung variety trial including trees of seven different parent-ages which had given evidence of cold resistance was planted in the spring of 1950. In both 1950 and 1951 exceptionally severe early fall freezes occurred while the trees were still in active growth. In January and February 1951 a severe cold snap occurred. Thus an opportunity was afforded to study the relative

TABLE 1. Cold injury to tung trees planted spring 1950 at Homer, Louisiana, during winters of 1950-51 and 1951-52.¹

Variety	Trees making satisfactory recovery as of June 5, 1951 ¹	Injury to new growth, January 5, 1952 ²
	Per cent	Rating
F-56	27.5	4.00
Lampton (F-578)	18.8	4.75
Gahl (L-51)	18.8	4.25
L-152 ²	31.2	4.50
Average 4 budded varieties	24.1	4.38
F-56-S	65.0	3.50
F-578-S	72.5	3.50
L-51-S	56.2	3.00
L-152-S	72.5	2.25
Average for seedlings of 4 budded varieties listed above	66.6	3.06
M-22	31.2	4.25
Isabel (L-2)	15.0	5.00
L-47-S	68.8	2.75
Least significant difference		
at .05	26.2	.91
at .01	—	1.23

Both in June 1951 and January 1952 the difference between the mean for seedlings and the mean for clones attained statistical significance beyond the .001 level.

¹Critical temperatures: 23° F., Nov. 23 and 24, 1950, when trees were still growing actively; 2° F. on Feb. 2, 1951; 20° F. on Nov. 3, 1951, when trees were still in active growth.

²Rated on scale ranging from 1.00 for trees not injured to 5.00 for trees completely killed.

resistance of the different types of trees to low temperatures, as will be noted in Table 1. —*George F. Potter, Benjamin G. Sitton, Samuel Merrill, Jr., R. E. Wright, and Dawson M. Johns*

Cantaloupe Variety Studies

Seven leading commercial varieties of cantaloupes were planted in replicated plots to determine comparative yields. Fifteen other varieties were planted for observation. All varieties were susceptible to nematodes, with most varieties dying about the blossom stage. None of the varieties included in these trials

showed sufficient resistance to this pest to offer material for selection. A nematode resistant variety is badly needed for the sandy areas of North Louisiana.

Peach Fertilizer Test

A fertilizer test planted in March, 1949, containing 14 treatments, produced a light crop of peaches in 1951. Production records, as well as growth data, indicate that peach trees need a liberal application of a complete fertilizer when they are grown in the sandy soils in the northern part of the state. Work on this project will be continued. —*R. E. Wright*

Peach Insecticide Studies

An experiment was begun this season for the purpose of evaluating the newer synthetic organic insecticides for control of insects attacking peaches. EPN, parathion, dieldrin, lead arsenate-DDT, and an untreated check were studied during 1951. Peach drops were collected and examined for curculio larvae. Mature peaches were scored for curculio infestation and cat facing from stink bug injury. Detailed records were made on lesser peach tree borer infestation at intervals throughout the season. This work is being continued and some expansion is contemplated for 1952.

—*R. E. Wright, C. E. Smith, L. D. Newsom, and J. S. Roussel*

Poultry

Broiler Production in North Louisiana

Approximately 100 individuals are now actively engaged in the production of broilers on a commercial scale in North Louisiana. These growers operate 120 brooder houses which have an annual output of about 1,879,000 birds, or 36,000 per week. These figures are based upon the assumption that each grower produces four and one-half broods annually. Thirty-one additional houses are under construction or being planned for early construction which will increase the annual production to about 2,500,000 birds, or a weekly output of 48,000.

Many broiler growers wish to expand their operations and expressed the opinion that the industry would increase 100 per cent within the next 12 months if an additional processing plant were established in the area and more adequate financial assistance were made available. With such an increase in production, the broiler industry would bring into the Homer, Ruston, and Farmerville area of North Louisiana about \$4,000,000 annually.

Costs and Returns Study of Broiler Production in North Louisiana

Data collected from 22 broiler growers in North Louisiana during 1951 revealed that the average grower had \$2,890 invested in broiler production facilities, or the equivalent of 71 cents per chick capacity. The data also showed that of 194,288 birds started, 182,901 were marketed, resulting in a livability of 94.1 per cent. Birds sold averaged 2.67 pounds each and consumed 7.7 pounds of feed in 9 weeks. A feed conversion of 35 pounds of meat per 100 pounds of feed was obtained. Costs and gross returns per brood amounted to \$1,830 and \$2,239 respectively, which is a labor income of \$409, or 15 cents per bird marketed. Ninety-five per cent of the total production was marketed through the local processing plants and the remaining portion was shipped to plants located in Mississippi and Texas. The year-round average price was 29.5 cents per pound at the farm, compared with a year-round cost of production of 24.7 cents per pound. —*G. E. King*

Hatching Eggs Vs. Market Eggs

Preliminary figures covering the period from October 1 to December 31, 1951, indicate that the production of hatching eggs is more profitable than the production of market eggs when a differential of five cents or more in price per dozen exists in favor of the hatching eggs.

Feed costs per dozen eggs produced amounted to 34 cents for the hatching eggs and 29 cents for the market eggs. Monthly feed consumption per hen was 11.3 pounds for the hatching egg group (including that eaten by the males), compared to 9.7 pounds for the market egg group.

—*G. E. King, C. W. Upp, and H. E. Hathaway*

New Hampshire Breed Vs. Indian River Cross for Broiler Production

In June, July, and August of 1951 a test was made to compare the feed consumption, livability, costs and returns on 900 New Hampshire and Indian River chicks under similar conditions. Feed consumption amounted to 8.3 pounds per bird sold for the Indian Rivers, compared to 7.2 pounds per bird sold for the New Hampshire breed. However, livability on the Indian River Cross was considerably above that of the New Hampshires, amounting to 96.3 and 89.9 per cent, respectively. When the birds were marketed at 10 weeks of age the Indian Rivers weighed an average of 2.56 pounds each, whereas the New Hampshires averaged 2.36 pounds per bird sold. Costs amounted to 70 cents per Indian River chick marketed and 63 cents per New Hampshire chick marketed, with net returns of 13.2 and 13.3 cents, respectively, per bird sold. (Results are of one brood only and should be considered tentative.) —*G. E. King, C. W. Upp, and H. E. Hathaway*

Dairying

Development of Strains of Cattle Especially Adapted to Southern Conditions

The composition of the dairy herd is as follows: Brown Swiss cows in milk, 24; Brown Swiss cows (dry), 9; Brown Swiss heifers under 6 months, 1; Jersey cows in milk, 10; Jersey cows (dry), 5; Jersey heifers 6 months and older, 9; Jersey heifers under 6 months, 21; $\frac{1}{2}$ Brown Swiss- $\frac{1}{2}$ Red Sindhi crossbred heifers in milk, 6; $\frac{1}{2}$ Brown Swiss- $\frac{1}{2}$ Red Sindhi heifers not in milk, 13; $\frac{1}{2}$ Brown Swiss- $\frac{1}{2}$ Red Sindhi crossbred heifer calves, 7; $\frac{3}{4}$ Brown Swiss- $\frac{1}{4}$ Red Sindhi crossbred heifer calves, 3. Production of the crossbred heifers will be compared with that of their dams. —*J. B. Frye and Fred Hathorn*

Northeast Louisiana Experiment Station, St. Joseph

C. B. HADDON, *Superintendent*

JOHN C. CARPENTER, JR., *Assistant Animal Husbandman*

JOHN A. HENDRIX, *Assistant Agronomist*

SHERMAN A. PHILLIPS, *Assistant Agronomist*

RUSSELL Y. RATCLIFF, *Research Associate in Agronomy*

Corn Fertilizers

Corn fertilizer tests were conducted as in the past, using various rates of nitrogen alone and varying rates of phosphorus and potash. All the fertilizers were applied as deeply as possible, and bedded on approximately two weeks prior to planting the corn. Nitrogen rates began at 60 pounds available N per acre and increased in 20-pound units to 120 pounds per acre; phosphorus at the rate of 40 pounds available with 80 and 100 pounds of nitrogen and 64 pounds available with the 120-pound rate of nitrogen. Potash was added at the rate of 64 pounds available with the 120 pounds nitrogen. The results indicate that 80 pounds of nitrogen per acre can be profitably used, the increase over check at this rate of nitrogen being 38.4 bushels per acre. The higher rates of nitrogen did not show a profit over 80 pounds. The addition of phosphorus at both the 48-pound and 64-pound rates showed some slight increase above the nitrogen alone, but not sufficient to justify recommending its use, the increase being only 1.6 bushels for

the 48-pound rate and 3.0 bushels for the 64-pound rate. No increase was shown by the addition of potash to the nitrogen or to nitrogen plus phosphorus. This test was conducted on very fertile soil, as indicated by the four-year average yield of 52 bushels per acre from the check plot. —*C. B. Haddon*

Corn Varieties

Twenty-two commercial hybrids and four open-pollinated varieties of corn were included in this test. As in previous years the average yield of the hybrids was about 20 per cent more than the average of the open-pollinated varieties. The highest yielding hybrid was Dixie 33, with 128.2 bushels, followed by Dixie 11 with 119.7 bushels, Dixie 22 with 117.4 bushels, and Woods' V-125 with 116.5 bushels per acre. Twenty-one of the hybrids produced more than 100 bushels per acre. The test was planted May 2. Two hundred pounds of ammonium nitrate per acre had been applied in deep furrow and bedded on two weeks before planting. Ninety pounds of ammonium nitrate was applied as a side-dressing May 31. Corn was planted in hills two feet apart, two plants per hill, or about 13,000 plants per acre. The growing season was extremely dry but, because of the deep application of fertilizer and ample organic content of the soil, no adverse effect of the drought was noted. —*C. B. Haddon*

Oat Varieties

Fifteen oat varieties from breeders and seedsmen were included in the test. Proven commercial varieties were used to check the performance of the new varieties and strains as to yield and disease resistance.

The yields were extremely good due to favorable weather conditions and no rust damage. The leading varieties in the 1950-51 test were Coker's Victorgrain 48-93, 93.2 bushels; D Hybrid 24893, 92.1 bushels; DeSoto, 90.1 bushels; Coker's 49-49, 86.2 bushels; Ferguson, 85.2 bushels; Alber, 84.8 bushels; Camellia, 72.9 bushels; Delta Red 88, 77 bushels; Coker's Fulgrain 48-107, 84.8 bushels; and Nortex 107(0112), 79.4 bushels per acre.

This test was planted in plots 6 by 220 feet and was fertilized with 32 pounds of nitrogen and harvested with a combine.

—*John A. Hendrix*

Winter Cover Crops

Since the use of Austrian Winter peas and common vetch for winter cover crops has been practically discontinued because of disease conditions, various other winter legumes have been tested

to take the place of these two. Several new strains of vetch, including imported seed, have been tried with varying degrees of success. Doark vetch from Arkansas has shown considerable resistance to diseases, is apparently winter hardy, and has made very good growth. On sandy land several strains of crimson clover have shown considerable promise. In 1949-50 and also in 1950-51 crimson clover gave the largest yield of green matter at time of turning, April 1, and also produced the largest yield of cotton that followed. On February 1, 1951, a temperature of zero was recorded at this Station with no apparent damage to the crimson clover. Further tests are being conducted to determine best method and rate of seeding, disease resistance, winter hardiness, and other features. —*C. B. Haddon*

Observation and Results of the Winter Grass Nursery

This Station has been cooperating with the main Station at Baton Rouge in conducting forage crop tests with various grasses. The chief objective of this project is to determine the adaptability and forage yields.

Nine grasses were included in this test, seven fescues, Harding grass, and rye grass. The test was planted October 27, 1949.

Results of two years' average green forage: Justice fescue, 18,220 pounds; Harding grass, 17,409 pounds; Kentucky 31 fescue, 16,936 pounds; Alta fescue, 16,552 pounds; Fescue 144, 15,928 pounds; Glasgow fescue, 13,996 pounds. Robertson and Chewing fescue did not produce any forage. Rye grass made a good growth the first year, but plots were not reseeded the second year.

After three years of testing, fescue has proved well adapted to the Delta soil in this area. The heavy buckshot soil has given good winter growth in plot work and grazing tests. Harding grass shows much promise for a winter pasture, but indications are that it is less winter hardy than the fescue or rye.

—*John A. Hendrix and C. R. Owen*

Mechanical Harvesting of Corn

A test was conducted to determine what percentage of loss may be expected by harvesting corn with a mechanical picker and what can be done to reduce these losses to a minimum. Seven different varieties were used in the test, planted in six-row plots, 300 feet long, replicated twice. Twenty-five feet on each of the four inside rows, a total of 200 feet, was harvested by hand. The remaining 200 feet of each of the four inside rows was harvested by mechanical picker, making a total of 800 feet mechanically

harvested from each plot. Yields were computed. Using the hand harvested yields at 100 per cent, the mechanically harvested was computed on this basis. Of the varieties used the least loss occurred in harvesting Coker's Coastal 811. This variety yielded 103.2 bushels per acre when gathered by hand and 85.7 bushels per acre when gathered by the mechanical picker, making a loss of 17 per cent, or 83 per cent of the crop mechanically harvested.

The percentage of harvest varies directly with the way that corn stands up at time of harvest. For maximum efficiency in mechanical harvesting, a variety of corn that stands up well, has a small stalk, uniform ear height, and fairly large ears should be used. Time is an important factor in mechanical harvesting. The corn should be gathered as soon as it is dry enough to keep. The mechanical picker has to be adjusted and operated properly. With mechanical harvesting at its best there will still be some loss. This loss may be recovered if livestock can be run behind the picker.

—*Russell Y. Ratcliff*

Production Cost of Feeder Pigs

Results obtained for the third consecutive year in production of feeder pigs to 100 pounds showed, as in the two previous years, that pigs could be produced cheaper than the same quality pigs could be bought on local markets. All costs were included in production except actual labor of feeding pigs. No return was figured for sale of sows. The spring 1951 litter was produced for 8½ cents per pound. Pigs were kept on good pastures at all times. All feed costs were figured at local prices of feed at time used.

—*John C. Carpenter, Jr.*

2,4-D in Corn

For economical and efficient harvesting with a mechanical picker, corn must be free of weeds and vines. To accomplish this, spraying with ¾ pound of technical 2,4-D in 10 gallons of water before the corn is seven or eight inches tall and again at lay-by time, increasing to 20 gallons of solution per acre, is recommended.

—*Russell Y. Ratcliff*

Chemical Weed Control in Soybeans

A test was conducted to study the effects of certain chemicals in soybeans as a means of controlling undesirable vegetation and effects on yield. Of these chemicals the dinitro herbicides used as a pre-emergence spray at the rate of 2 pounds technical material per acre on a 12-inch band gave the best results. There was no effect on yield from the material. The post-emergence herbicidal

oils used gave good weed and grass control, but, if they are not used very carefully, severe damage to the bean plants will result.

Since this is only one year's work, no definite conclusions can be made, but beans lend themselves readily to pre-emergence sprays because of the fact that they are planted thick and grow off fast. By the time the pre-emergence sprays are losing their effects the beans should be large enough to shade out undesirable vegetation. In all probability the increase in combining efficiency and time saved through the elimination of weeds in beans will offset the additional expense incurred by using pre-emergence sprays. —*Russell Y. Ratcliff*

June Planted Corn Variety Test

Twenty hybrids were included in this test, which was planted June 19. Ninety-two pounds of available nitrogen was applied in deep furrow and bedded on June 2. Corn was planted two plants per hill, hills being spaced two feet apart. Notwithstanding the extremely dry and hot summer, excellent yields were obtained, considering the lateness of planting. Leading hybrid was Dixie 11, which produced 93.8 bushels, followed by N. C. 27 with 92.5 bushels, Funk's G 791W with 90.8 bushels, and Funk's G 7-11 with 90.4 bushels. As in previous years the test shows that profitable yields of corn can be produced from June planting, if the seedbed is well prepared in advance and adequate fertilizer is applied and placed as deep as possible. —*C. B. Haddon*

Soybean Varieties

This Station has been cooperating with the U.S. Regional Soybean Laboratory in conducting uniform soybean tests on new varieties and strains. The objective of this work is the development of adapted varieties for oil production.

Forty-five varieties or strains were included in the test. They are grouped according to maturity from early September to late November. Most of the strains have not been named and have not been released for commercial production. Several outstanding strains show promise and will be released when seed are available.

The commercial test includes proven varieties and new promising strains to determine those best adapted to the Delta soils for the production of oil and seed beans.

The varieties producing satisfactory yields over a period of years are: Early maturing group — S-100, 27.3 bushels per acre; medium early group — Ogden, 38.8 bushels per acre; medium late group — Roanoke, 29.6; Volstate, 26.5; Dortchsoy 31, 26.9 bushels

per acre; late maturing group — Mamotan 6680, 21.8; Nela, 18.8; Pelican, 18.6; Acadian, 15.2 bushels per acre.

—*John A. Hendrix and John Gray*

Corn, Soybeans, Cotton Rotation

This test was set up two years ago and is designed to determine (1) the effect on yield of corn of interplanting soybeans and corn, (2) the effect on corn when the crop is planted two rows double spaced and double fertilized alternated with two rows of soybeans, (3) the effect on yield of cotton following the various methods of planting corn. The two year average yields were: corn alone, 81.6 bushels; corn interplanted with soybeans, 73.0 bushels; and two rows corn alternated with two rows beans, 69.3 bushels. The average yield of beans was 18.3 bushels per acre where rows were alternated with corn.

Cotton was planted following the above methods of planting corn. The yields were: following corn alone, 1533 pounds; following corn and beans interplanted, 2165 pounds; following corn and beans in alternate rows, 2068 pounds per acre. —*C. B. Haddon*

Early Versus Late Soybeans for Hogging Off With Corn

In selecting a variety of beans for planting in corn to be hogged off, should a medium early variety or a late maturing variety be used? Based on two years results at this Station, it apparently makes very little difference. In this test a medium early variety, Ogden, was compared with one of the latest maturing varieties, Nela. At the time the hogs were turned in, the Ogden variety was carrying a full crop of beans, the pods being well filled, but not beginning to mature. The Nela beans had not begun to fruit, but carried a rather heavy foliage. The pork produced from corn interplanted with Ogden totaled 815 pounds, and with Nela 830 pounds per acre. It required 4.00 pounds of corn to produce a pound of pork when interplanted with Nela and 4.34 pounds of corn when interplanted with Ogden. There is no significant difference between these figures. Based on these results, it would appear that in selecting a variety of beans to interplant with corn to be used for hogging off it is immaterial whether the beans are fruiting or not. —*John C. Carpenter, Jr.*

Pasture Work

A grass new to this section, Prairie Brome, was tried in pasture this year. This grass had shown fairly well in small plots for two years prior to being planted for grazing. Seeding was done in

the fall of 1950 at rate of six pounds per acre on a well-prepared seedbed. The pasture had been in Dallis grass and Persian clover for the past several years. A very thin stand of the grass was obtained, owing to light rate of seeding. Persian clover volunteered to a good stand. The pasture, 8 acres, was grazed from April 3 to the end of August; six to ten head of grade Hereford and Angus steers were used. The beef produced during the grazing period was 212.5 pounds per acre. This compares with a production of 219 pounds per acre on white Dutch clover and Bermuda grass, 226 pounds per acre from red clover and Dallis grass, and 266 pounds per acre from Kentucky 31 fescue and white Dutch-Ladino clovers.

The Brome grass apparently has a high degree of palatability, grows back well after grazing, and comes back from sod the second winter. Because of the promising results obtained from this grass, further work will be done with it. —*John C. Carpenter, Jr.*

Outfield Experiments

Cotton Fertilizer

A cotton fertilizer experiment was conducted in Ouachita Parish, using nitrogen levels of 48, 72, and 100 pounds; phosphate and potash levels of 48 and 72 pounds, respectively, per acre. The check plot yielded 1,340 pounds of seed cotton per acre. A 48-48-48 formulation gave the highest yield, 2,053 pounds, an increase of 713 pounds over the check plot. At higher rates of fertilization the yield of cotton decreased. A 72-72-72 formulation yielded only 1,642 pounds, or 411 pounds less than from a 48-48-48 formulation. At extremely high rates of fertilization the cotton made too much vegetative growth, making it harder to control cotton insects.

Soybean Fertilizer and Variety Experiments

A soybean fertilizer experiment was conducted on Olivier silt loam in West Carroll Parish. Nitrogen was applied at the rate of 16 pounds per acre, phosphate and potash at rates of 24 and 48 pounds. One thousand pounds of lime per acre was applied to plots receiving a 16-24-24 and 0-48-48 formulation. There were two check plots, one of which was inoculated.

This is the second year that soybean fertilizer tests were conducted on Olivier silt loam. The results obtained in both years showed no increase in yields from the addition of fertilizer, inoculation, or lime.

At the same location a soybean variety test was conducted with some of the leading commercial varieties. The two-year average yields on Olivier silt loam are as follows: Early maturing — S-100, 19.5 bushels; medium early — Ogden, 36.1 bushels; medium

late — Dortchsoy 31, Volstate, and Roanoke, 36.0 bushels; late — Acadian, Pelican, Nela, Red Tanner, and Mamotan 6680, 29.0 bushels per acre. Of the late maturing group Mamotan 6680 has given highest yield.

Oat Fertilizers

An oat fertilizer experiment was conducted on Olivier silt loam in West Carroll Parish. Twelve different fertilizer treatments were used. Nitrogen was applied at rates of 32 and 64 pounds per acre, phosphate and potash at rates of 24 and 48 pounds per acre, respectively. No significant differences were obtained from either phosphate or potash when used separately with nitrogen, or when used in combination with nitrogen. Sixty-four pounds of nitrogen, 32 pounds applied in the fall and 32 pounds as top-dressing in the spring, gave the highest yield, 54.9 bushels per acre; the check plot yielded 18.8 bushels per acre. The 64 pounds of nitrogen gave an increase of 36.1 bushels per acre over the check plot. The results of one year's work, while not conclusive, do show that where small amounts of nitrogen are used greater yields will be obtained if it is applied as top-dressing in the spring. With heavier applications of nitrogen, split applications give the best results. Apply about half in the fall and the remainder as top-dressing in the spring. —*Sherman A. Phillips*

Plaquemines Parish Experiment Station, Diamond

RALPH T. BROWN, *Superintendent*

FREDERICK B. SCHMITZ, *Assistant Horticulturist*

Improvement of research facilities was continued during the year. A temporary lean-to greenhouse was constructed for starting plants. A permanent greenhouse was also constructed for the same purpose as well as for floricultural and breeding work. The storage shed was also enlarged to house equipment which has been purchased or leased to take care of the expanding research program at this Station.

Citrus

The fertilizer work with citrus was continued, both with bearing Owari Satsuma trees at Mr. Felix Elston's and young Owari Satsuma and Washington navel trees at the Station. All trees were badly damaged by the freeze in February, 1951, when the temperature went to 20° F., which was the coldest weather for

this area in 50 years. The young navels were so badly damaged that it was decided to replant the record trees in the test.

One rootstock planting was made this winter and seedling rootstocks, furnished by Dr. Frank E. Gardner for the second planting, have been planted for budding in the fall of 1952. This work is being carried on to find a rootstock better adapted to this area than sour or trifoliata, the two which are used most widely at present. The citranges were equal to trifoliata in cold hardiness.

Vegetable Crops

Bush Beans

Contender again excelled in production, producing an average of 153 bushels per acre. Topcrop and Wade (B 1515-1-7-1-2) were second and third with yields of 126 and 111 bushels per acre, respectively, as compared with 47 bushels per acre for Stringless Black Valentine.

Contender was tried extensively in commercial plantings in this area, where it is gaining in popularity as an early maturing, high quality, fresh market bean for early plantings, as a replacement for Old Time Black Valentine.

Wade was unexcelled in appearance, producing a round, straight, dark green bean of high quality. It appears especially desirable for home garden, shipping, and freezing as a replacement for Stringless Black Valentine. It is later in maturity and more vigorous in growth than Contender.

Topcrop, another high yielding, early maturing variety which is similar to Tendergreen in roughness, is not recommended for commercial plantings in this area, but is a good home garden type when the beans are picked every other day.

Cabbage

Early Maturing Types—Ferry's Copenhagen Market was the most productive of the early maturing types, producing 11,106 pounds of marketable cabbage per acre as compared with 10,834 pounds for Reuter's Green Acre. Both are dark green in color, oval to round in shape, uniform in type, and concentrated in heading. Green Acre has slightly shorter core and is a little more compact.

Medium Early Maturing—Reuter's Imported Glory was the most uniform of the strains tested, was more concentrated in heading and about equal to the others in quality, producing a medium to dark green head averaging 2.3 pounds per head. The yield per acre was 15,869 pounds as compared to 16,278 for Reu-

ter's Regular Glory; 15,706 for Ferry's Regular Glory, and 12,086 pounds per acre for Ferry's Resistant Glory.

Late Maturing—Marian Market was the most productive, followed by Ferry's Bonanza and Ferry's Round Dutch, producing 15,564 and 12,249 pounds per acre and averaging 3.8 and 1.7 pounds per head, respectively. Bonanza was unexcelled in internal appearance, producing a very compact head, which remained headed for a longer period following maturity than most varieties. It seems promising as a sacking type for mid-winter planting, where a medium size cabbage is desired. Round Dutch is a round, dark green cabbage with internal appearance next to that of Bonanza. Marian Market is a large, medium green, loose-headed type.

Very Late Maturing—Stein's Flat Dutch and Wisconsin All Season were the most productive, producing 18,564 and 18,020 pounds of marketable heads per acre, respectively. Both are large, loose-headed types of poor internal quality, averaging 3.1 and 2.5 pounds per head, respectively.

Cauliflower

Two plantings were made, one in July and one in August, the average of which is presented in the following paragraphs.

Early Maturing—Henderson's Primosnow, Ferry's Snowball A, and Reuter's Snowball Y were very similar in type. All three were very concentrated in heading, maturing 90 to 100 per cent of their heads within a two-week period. All had wavy leaves and a spreading type growth with poor to fair wrapper leaves. The wrapper leaves on Reuter's Y were very brittle, making it very difficult to tie. They seemed to be better adapted to early fall planting, where more heat resistant types are desired. The yield was 5,716, 4,764, and 5,172 marketable heads per acre averaging 1.9, 1.6, and 1.4 pounds per head, respectively. Primosnow was used in only one planting this season, which was the first time that it had been tested at this Station, but it shows promise.

Reuter's Snowdrift and Ferry's Snowball E were the most productive of the early maturing types with an extended harvest season. They produced 4,900 and 5,172 marketable heads averaging 1.8 and 1.6 pounds per head, respectively. Snowball E was the most uniform in heading type. Both have excellent wrapper leaves and are better adapted to home garden use, where an extended harvest season is desired.

Medium Early Maturing—Ferry's Snowball M, Reuter's Stella Nova and Reuter's Supersnowball were superior to the other varieties, producing 3,947, 3,403, and 3,267 marketable heads per acre averaging 2.0, 1.8, and 2.3 pounds per head, re-

spectively. More plants have been lost during the past two growing seasons in early fall plantings with Supersnowball than with the other two varieties; therefore, it seems better adapted to plantings made from August 15 to September 15 than to earlier plantings. Under the conditions of these tests this season, Stella Nova was the most irregular in shape and produced more heads with leaves in the curd than the other two varieties.

Late Maturing—Ferry's Y had the highest yield of marketable heads, producing 3,811 heads averaging 1.8 pounds. Ferry's X is similar but more irregular in maturity and head type; two to five per cent of the heads were green.

Irish Potatoes

Of the red varieties tested, LaSoda again was unexcelled in appearance, production and keeping quality. It produced an average of 270 bushels of number one potatoes per acre as compared with 188 for Triumph. It is being tried extensively in commercial plantings as a replacement for Triumph.

Kennebec was again the most productive of the white-skinned types, but under certain conditions has shown a great deal of hollow heart and therefore is not recommended.

Tomatoes

Twenty different commercial and home garden varieties have been grown in the spring trials by Dr. J. J. Mikell and Dr. J. C. Miller during the last two seasons. Average yields of marketable tomatoes in pounds per acre for the leading varieties during this period were as follows: Jefferson, 34,106; Gulf States, 33,820; Rutgers, 33,181; Marglobe, 31,057; Lakeland, 29,301; and Grothen Globe, 20,074. Jefferson, Rutgers, and Marglobe are later maturing and therefore are not satisfactory for commercial production in this area. However, they are promising home garden types, where red-fruited varieties are desired. Red-fruited Lakeand is the most promising early maturing variety as a replacement for Grothen Globe, producing a medium-sized, globe-shaped tomato. Grothen Globe, an early large-fruited, red-skinned variety of excellent shipping quality, is the variety most widely planted commercially in this area.

Cucumbers

Burpee's Surecrop Hybrid, Niagara, Marketer, and S.C. 10-3 were the most productive of the twelve varieties tested in the spring, producing 189, 165, 162, and 155 bushels of marketable cucumbers per acre. Burpee's Surecrop Hybrid was slightly earlier than the other varieties, but was too pale in color. Marketer is the most productive and highest in quality of the slicing varie-

ties tested. S.C. 10-3 is a promising mildew resistant breeding line which is similar to Marketer.

In the fall trials, S.C. 10-3 was the most productive with a yield of 232 bushels of marketable cucumbers per acre as compared to 106 bushels for Marketer.

Bush Lima Beans

Bigsby (Oklahoma 8-2) exceeded all other varieties in production, producing 6,404 pounds of marketable beans per acre, followed by Clark's Bush, Evergreen, Early Thorogreen, and Henderson Bush, which produced 4,412, 3,812, 3,033, and 2,089 pounds per acre, respectively. Early Thorogreen, Bigsby, Clark's Bush, and Henderson Bush were earlier maturing than Evergreen. Evergreen and Early Thorogreen produced the highest quality dark green shelled beans. Bigsby does well under hot dry weather conditions similar to the growing conditions of this season, but is more susceptible to pod and leaf diseases under wet conditions than Early Thorogreen and Clark's Bush.

Shallots

The shallot variety work was continued by Dr. August E. Kehr this season. Of the nine strains tested No. 7 gave the highest yield, producing 1,497 dozen bunches per acre as compared with 1,456 dozen for a selection from the Chase Station and 531 dozen bunches for Louisiana Pearl, the variety used as a standard. Strain No. 7 was outstanding in appearance, producing a vigorous plant that was upright in growth habit with a round leaf and good bunching characteristics. The Chase selection was similar but had a more onion-shaped leaf. Strains No. 8 and 13 were promising. Strains No. 7 and 13 showed less tip burn than did the other strains.

Butter Beans

In 1951, the Carolina Sieva, Willow Leaf, and Easy Shell yielded 355, 283, and 270 bushels per acre, respectively. However, as indicated by the name, Easy Shell is easier to shell, a characteristic which might give it preference over the other varieties. The "Florida Speckled" variety (not a white bean) yielded 416 bushels per acre.

Broccoli

Texas No. 107 exceeded all other varieties in total production, producing 9,609 pounds per acre as compared with 9,010 for Woodruff's DeCicco and 8,030 for Associated Seed Growers Early Green Sprouting. Texas 107 was the earliest maturing and was second to Woodruff's DeCicco in size of main head, the average weight being .77 pound per head as compared with .90 and .55

pound per head for Woodruff's DeCicco and Associated Seed Growers Green Sprouting, respectively. There were fewer heads with open sepals in Texas 107 and Early Green Sprouting than DeCicco. Under conditions of this test, Texas 107 is the most promising bunching type for the New Orleans market. Early Green Sprouting was the best of the sprouting types.

Root Aphid Study

The work on root aphid control was again carried on by Mr. E. H. Floyd, Entomologist at the Main Station. The application of one pound of technical Lindane with the fertilizer prior to planting more than doubled the yield of marketable rutabagas per acre in the spring of 1951. Where one pound of technical Lindane was applied with the fertilizer in the fall of 1951, the yield of cabbage was 14,058 pounds per acre as compared with 9,900 pounds where no Lindane was applied. There was a very slight infestation on an occasional plant where one pound of Lindane was used and a severe infestation in the check plots on January 9, when the counts were made.

Pole Snap Beans

Canfreezer and Green Savage were the outstanding varieties in the trial, yielding 260 and 235 bushels per acre, respectively. The observational trial indicated that a selection of Green Savage-Green Savage No. 8 is more uniform than its parent.

Eggplant Hybridization

In an observational trial, two crosses, New Orleans Market x Fort Myers Market and New Orleans Market x Black Beauty, outyielded all the standard varieties and retained good shape and color. Crosses were made using standard varieties as well as varieties from Puerto Rico and India, for a yield test to be planted in 1952.

Globe Artichokes

A preliminary planting of seed and rootstocks from California was made in the summer. An attempt will be made to revive the growing of artichokes in Plaquemines Parish, a practice which was discontinued some 20 years ago because of difficulty in controlling certain insects.

Okra

A variety test of four varieties was planted in duplicate plots. On July 17 when the okra was over six feet tall and the market price very low, one complete planting was cut back to ten inches. The second planting was cut back on August 17. After the

heading back, the plots were cultivated. The plants sprouted rapidly and production was resumed approximately thirty days later. Green Velvet and Dwarf Green Velvet gave best results before cutting. After cutting, the Dwarf Green Velvet was the leading variety. In the over-all total, Dwarf Green Velvet was the best producer.

Strawberries

Seedling 45-3, produced by the Louisiana State University Experiment Station, gave the best yield, 135 crates per acre. Seedlings L-27 and 7-42 gave promising yields.

Floriculture

A test rose garden (a branch of the main garden in Baton Rouge) was planted to 15 varieties of hybrid tea roses and preliminary work started on a rose rootstock test.

Twenty varieties of hibiscus were included in a variety test and over twenty varieties of day lilies were planted in duplicate.

The Creole Easter lily fertilizer test was again planted.

Red River Valley Experiment Station, Curtis

J. Y. OAKES, *Superintendent*

L. L. MCCORMICK, *Assistant Agronomist*

W. A. NIPPER, *Assistant Animal Husbandman*

E. B. MITCHELL, *Assistant Entomologist*

The program of research work at the Red River Valley Experiment Station was continued as in 1950. The harvesting of crops in 1951 marked the fourth year of research since the establishment of the Station. The general trend of work, as in previous years, deals with crops common to the Red River valley, with special emphasis being placed on the newer and better varieties adapted to the area.

The pasture and beef cattle phase of the research program is now almost abreast of other activities at the Station. Additional pastures have been developed. High quality herd bulls have been purchased for use in improving the station herd, which is a step in the right direction for improving the livestock program.



Entrance to Red River Valley Experiment Station at Curtis.

Corn Work

Commercial Hybrids Test

Higher corn yields have been obtained in the Red River Valley as a result of using hybrid varieties over open-pollinated varieties. Among the commercial varieties grown, several varieties in both yellow and white have consistently produced high yields and have proved very satisfactory for the area.

In the 1948 test, best yields were obtained from Dixie 11, N. C. 27, La. 468, Dixie 17, and Funk's G-714.

In the 1949 test, best yields were obtained from Dixie 11, Dixie 17, La. 468, La. 521, Funk's G-790W, Dixie 18, Funk's G-714, and Funk's G-737.

In the 1950 test, best yields were obtained from Dixie 17, Funk's G-714, Dixie 33, Dixie 22, Funk's G-780W, Funk's G-737, La. 468, Dixie 11, and Dixie 18.

In the 1951 test, best yields were obtained from Dixie 22, Dixie 11, Funk's G-791W, Funk's G-780W, Funk's G-714A, La. 9011, Dixie 18, and La. 468. Several other varieties produced high yields but the ones named have consistently produced high yields for four consecutive years.

Experimental tests with newly developed hybrids indicate that some of them offer considerable promise as a result of producing high yields and having other desirable characteristics such as erect stalks and good shuck coverage.

—J. Y. Oakes, L. L. McCormick, and H. W. Ivy

Early Hybrids

Early hybrid corn in the Red River Valley area may be of importance for hogging off. The use of early hybrids for commer-

cial use is doubtful, however, owing to their susceptibility to worm, weevil and bird damage. Poor shuck coverage on early hybrids also results in rapid deterioration in the field. The storage of these varieties is very difficult because of these factors.

—*L. L. McCormick and J. Y. Oakes*

Corn Fertilization

The corn fertilizer work included sources of popular nitrogen fertilizers applied at different rates to determine response of corn in yield from each material. Phosphorus and potassium were added at uniform rates with medium and high applications of nitrogen to determine the place of these elements as measured by corn yields.

The results for 1951 substantiate yield data for previous years in that 90 to 100 pounds of nitrogen is required to produce maximum yields. There were no significant differences between sources of nitrogen materials at the same level of application, but differences did exist in all cases between the 64- and 96-pound rates of application. Where phosphorus and potassium were added with nitrogen at the 96- and 128-pound levels, there was little difference in yield over nitrogen alone and it is questionable whether the cost of material was justifiable. The response from phosphorus and potassium seems to follow previous yield pattern in that little response was obtained.

—*J. Y. Oakes and L. L. McCormick.*

Corn Spacing

The proper spacing of corn and the number of stalks per hill for maximum yields in the Red River Valley is still questionable, but it is necessary to have an adequate number of stalks with sufficient plant food to obtain best results. Yields also depend, however, on general fertility of the soil, amount of fertilizer applied, seedbed preparation, cultural practices, variety, and seasonal conditions.

In 1950, two plants every 12 inches gave best yield, 126.6 bushels per acre, followed by one stalk every 12 inches, with 100.7 bushels per acre. In 1951 best yield, 108.3 bushels per acre, was obtained from two plants every 12 inches. The spacing of one stalk every 12 inches gave a yield of 103.3 bushels per acre, whereas two stalks every 24 inches produced 100.6 bushels per acre. The general trend for two years favors the closer spacing for high yields. —*L. L. McCormick*

Corn and Soybean Fertilization

Corn yields have a tendency to remain constant where corn follows corn year after year. Where soybeans are interplanted with corn, the corn yields appear to be materially reduced the

first year but have a tendency to gain the second year as a result of the residual effects of soybeans. Where nitrogen fertilizer was added in 40-, 80-, and 120-pound applications, the yields of corn were increased with each increase in amount of fertilizer. Where corn and soybeans were interplanted at each rate of application, the yields were reduced in comparison with where corn was planted alone. In each case where corn followed soybeans the previous year, an increase in yield of corn was obtained.

—*J. Y. Oakes and L. L. McCormick*

Mechanical Corn Picking

In the production of hybrid corn, several factors are involved that regulate their desirability. These factors are: they should be high producers, have good shuck coverage, have stalks of medium height, have ears at a medium uniform height on stalks, and have stalks that stand erect and are resistant to storm damage.

Nine high yielding hybrids were included in a mechanical picker test in which a one-row John Deere No. 101 Snapper was used for harvesting. The results are as follows:

Variety	Yield, Bushels Per Acre	Bushels Picked Mech.	Bushels Hand Picked	Per Cent Machine Picked	Husk Covering	Per Cent Plants Erect	Stalk Height, Inches	Ear Height, Inches
Dixie 11	90.1	55.9	34.2	62.0	Fair	43	95	55
La. 521	80.5	53.5	27.0	66.5	Good	62	105	61
La. 468	79.7	57.1	22.6	71.6	Fair	55	90	55
Dixie 18	79.3	62.2	17.1	78.4	Good	73	107	63
N. C. 27	79.0	65.8	13.2	83.3	Poor	79	100	55
Funk's G-721	76.2	60.3	15.9	79.1	Poor	64	86	46
Funk's G-714A	73.0	49.6	23.4	67.9	Fair	60	85	50
Coker's Coastal 811	72.4	66.3	6.1	91.6	Fair	90	94	49
Jarvis Prolific	56.7	39.9	16.8	70.4	Fair	64	95	42

Cotton Studies

Cotton Fertilization

The cost of producing cotton in recent years has made fertilization a must in the cotton program in the Red River Valley. By the use of good seed, good seedbed preparation, proper fertilization, and thorough insect control measures, farmers have begun to approach maximum yields.

The use of mixed fertilizers in the production of cotton in the Red River Valley has not been a common practice. The use of nitrogen fertilizer alone has been a very common practice, since maximum yields are generally obtained from 40 to 60 pounds of nitrogen.

The results from the mixed fertilizer at different ratios for

four years do not offer a clear picture in the form of yields obtained. In general, best yields have been obtained from 600-pound applications of 8-8-8, 12-8-8, 8-8-4, and 8-0-8. Forty or fifty pounds of nitrogen have also given equally good yields.

—*J. Y. Oakes and L. L. McCormick*

Cotton Varieties

An analysis of several commercial varieties and new strains shows that Delfos and Deltapine strains rank high or at the top in production. Fox is becoming very popular in the valley area and was a high producer, ranking second in the test but ranking lowest in per cent of cotton harvested at first picking.

New strains and varieties are constantly being tested, but it would be well to note that even though some of the newer strains perform well, seed is not available. As a result commercial varieties, such as Deltapine, Fox, Coker 100WR, Coker 100 Staple, Stoneville, Delfos, Bobshaw, Miller, Empire, and Plains, will have to be relied upon for top production.

—*J. Y. Oakes, L. L. McCormick, and F. W. Self*

Chemical Weed Control in Cotton

The use of mechanical and chemical means for controlling weeds and grass in cotton fields in order to reduce hoeing costs is becoming very popular. Dinitro compounds as a pre-emergence application have been used very successfully in holding back weed and grass growth in cotton for a period of six weeks. Following the pre-emergence application with two post-emergence applications of herbicidal oil at five- to six-day intervals, sprayed in the drill at the base of cotton plants, has further retarded the growth of grasses and weeds an additional three to four weeks. At this stage of growth, the cotton plants were large enough to stand flame cultivation by which practically all weeds and grass could be further controlled, causing a reduction of approximately 50 per cent in the over-all cost of production.

—*J. Y. Oakes and L. L. McCormick*

Cotton Defoliation

The defoliation of cotton is very important, as it helps prevent the lower bolls from rotting in rank cotton, makes hand picking easier, and is necessary for machine picking. Several materials are available for commercial use, some of which have proved to be satisfactory whereas others are still being used experimentally and do not perform entirely satisfactorily.

Defoliant that appear to give satisfactory results are Aero Cyanamid Special grade, X-5 (monosodium cyanamid-soluble

grade), Shedoleaf, Ortho C-1 and X-10 (monosodium cynamid-dust). —*J. Y. Oakes*

Cotton Insect Control

General Insecticides—Commonly used commercial insecticides were tested to compare their relative effectiveness in controlling cotton insects. Three replications were used, with insecticide applications and infestation counts being made at five-day intervals. Results of the tests showed that where 3-5-40 dust was used cotton produced 1818 pounds of seed cotton per acre; toxaphene-DDT spray, 1738 pounds; aldrin dust, 1351 pounds; dieldrin spray, 1531 pounds; toxaphene dust, 1602 pounds; and aldrin spray, 1415 pounds. All of the materials gave about the same control of boll weevils. The difference in yields was due to the difference in the amount of bollworm damage. The necessity of DDT for bollworm control can be readily seen.

Rates of DDT for Bollworm Control—In many instances, if the application of DDT for bollworm control is timed and applied properly, smaller rates can be used with just as efficient control. Six different rates of DDT spray were used at five-day intervals, with the first application being made when the bollworms were in the egg stage. Where 1/4 pound DDT per acre was used, the cotton produced 1497 pounds of seed cotton per acre; 1/2 pound DDT, 1566 pounds; 3/4 pound DDT, 1520 pounds; 1 pound DDT, 1519 pounds; 1 1/4 pounds DDT, 1415 pounds; and 1 1/2 pounds DDT, 1378 pounds of seed cotton per acre. Although the difference in yields was not significant, in all three replications the yields went down when the rate of DDT exceeded 1 pound per acre. The higher rates of DDT with the dry weather conditions might have been responsible for this reduction. The results show that 1/2 to 3/4 pound DDT per acre is sufficient to control bollworms if the control measures are started in time and applied at regular intervals. —*E. B. Mitchell and L. L. McCormick*

Comparison of DDT as a Dust or Spray—The necessity for bollworm control is fully realized. This test was conducted in an effort to determine whether the spray or dust form of DDT would be more effective for bollworm control. Four replications were used, with the applications being made at five-day intervals. The results showed that the dust-treated cotton produced 960 pounds of seed cotton per acre while the spray-treated cotton produced 971 pounds per acre. This difference was certainly not significant, but an untreated check produced only 196 pounds of seed cotton per acre. DDT is necessary for bollworm control. Either the dust or spray can be used, but it should be applied when the bollworms are in egg stage or very small larvae. —*E. B. Mitchell*

Soybeans

Several popular commercial varieties of soybeans are grown each year to check their performance in yield of beans for crushing and forage production. Early maturing varieties are included in the test. The early varieties are not desirable because they produce low yields, shatter badly, and deteriorate rapidly unless harvested immediately upon maturing. Some of the medium early varieties, such as the Ogden and S-100, are not too desirable for seed purposes or crushing, as they deteriorate rapidly under adverse weather conditions if not harvested when mature. They are desirable, however, where grown with corn for hogging off. The Laredo is highly desirable for hay, owing to the fine stems and abundance of foliage, but is not too desirable as an oil bean.

Other varieties that perform well in the valley area for bean yields and forage include the Palmetto, Roanoke, Volstate, Acadian, Mamloxi, Avoyelles, Mamotan and Improved Pelican. Of these varieties, the Improved Pelican is the best general purpose bean.

The Station has been cooperating with the U. S. Regional Soybean Laboratory in conducting uniform soybean tests on new varieties and strains. The chief objective of the project is the development of adapted varieties for crushing. Numerous varieties and strains that range in maturity from early September to early November are included in the test. Outstanding strains or varieties will be released as soon as their performance merits it.

—*J. Y. Oakes, L. L. McCormick, and John P. Gray*

Oat Varieties

Several prominent varieties of oats are included in the variety test each year for checking winter hardiness, forage production, and grain yields. Varieties recommended for southern conditions are included in the test with the expectation of getting an outstanding variety that is adapted to Northwest Louisiana conditions. Of the varieties included in the test, some are more susceptible to winter kill than others.

Of the varieties included in the test, the Letoria, Victorgrain 48-93, Fulgrain BRS, Coker 49-49, Traveler, and Southland appeared to be the best varieties for grazing. The Camellia and La. 42-48 are excellent forage producers but are more likely to be winter killed.

The majority of the other varieties included in the test, Nor-tex, Ferguson, Alber, Appler, Mustang, Delta Red, DeSoto, Carolina Red and like varieties, produce satisfactory forage for grazing and good grain yields.

None of the varieties included in the variety test for four consecutive years offer both excellent forage qualities and high grain production. —*J. Y. Oakes and L. L. McCormick*

Forage Crop Studies

Alfalfa Varieties

Results for three years with several varieties of alfalfa indicate that some varieties will produce fairly uniform yields for a satisfactory period of time. Several varieties have had a tendency to yield less and less each year. This may be attributed, however, to some varieties being less winter hardy and as a result suffering from freeze damage. Results for the three years are as follows:

Variety	1949	1950	1951
	Tons Hay Per Acre	Tons Hay Per Acre	Tons Hay Per Acre
Southwestern Common	10.41	7.99	8.78
Buffalo	7.74	8.08	9.93
Ranger	9.10	6.96	8.00
Atlantic	9.36	7.64	7.80
Oklahoma Common	9.90	7.31	7.51
Arizona Chilean	9.70	8.01	7.26
Kansas Common	9.21	7.28	6.93
Hairy Peruvian	10.35	8.01	6.88
Peerless	9.99	7.78	6.29
French Du Puitt	9.46	6.73	5.72
African	7.30	5.37	4.19
Williamsburg	—	—	4.68*

*Four cuttings made from Williamsburg and five from all others.

Sudan Grass

For three consecutive years Tift, Sweet, and Common Sudan have been included in a test to determine the performance of each variety. In 1951 two new strains of Sudan and pearl millet were added to the test. Yields from each variety and strain are as follows:

Variety	1949	1950	1951
	Tons Hay Per Acre	Tons Hay Per Acre	Tons Hay Per Acre
Tift	16.3	10.6	6.68
Sweet	15.9	9.92	7.44
Common	12.5	7.85	5.36
Sweet No. 372	—	—	7.25
Sweet S-1	—	—	7.30
Pearl Millet	—	—	4.40

Sudan grass makes an excellent hay if cut at the proper stage, but it is very slow about curing because the stalks contain a large amount of moisture. Sudan provides an excellent grazing crop for temporary pasture. —*L. L. McCormick and J. Y. Oakes*

Lespedeza

For three consecutive years Kobe, Korean, Common, and Serecia lespedeza have been under test. None of the varieties have performed satisfactorily, as they died out early in the summer. It is doubtful whether any of the lespedeza varieties suited to grazing or hay will survive in the Red River Valley, except in isolated areas where the soils are extremely sandy and slightly acid in reaction.

Grasses

Numerous grasses of both annual and perennial species have been under study since the establishment of the Station. Dallis, Bermuda, fescue (Kentucky 31) and brome grass appear to be well adapted. All grow with considerable vigor, withstand droughty conditions, and respond well to applications of fertilizer, particularly nitrogen. Coastal Bermuda has made excellent growth and offers excellent possibilities as a pasture grass and for hay purposes. Fescue grass offers excellent possibilities on the heavier soils, but its use on sandy soils is still questionable. Fescue requires a large amount of fertilizer and dies out badly under extremely droughty conditions on sandy soils. Of the several species of rye grass, the so-called perennial type offers the best possibilities for grazing. It is a vigorous seed producer and will normally produce enough seed for reseeding.

King Ranch bluestem and Lovegrass offer some possibilities for hay or grazing as both withstand droughty conditions extremely well.

Preliminary tests with Pangola, Rhodes, Bahia, carpet, Panic and Teff grass indicate that their place is questionable in view of other grasses that have proved more satisfactory.

Reeds canarygrass, orchardgrass, tall oatgrass, Trinity creeping fescue, Bulbous bluegrass, Smilo, and Veldt grass offer little from the grazing standpoint and apparently lack adaptability.

White Clover

Results for several years have shown Louisiana white clover and strains derived from it to be superior for both grazing and the production of seed. Louisiana synthetic strains 1 and 2 offer excellent possibilities, as they produce a vigorous growth, an abundance of seed, and survive during most of the summer.

Mother Clover (giant white Dutch) and Ladino do not differ

materially in growth character but differ considerably in bloom and seed production, as Ladino produces few blooms and seed. Kentucky Green Acres clover appears to be of the Ladino or giant white Dutch strain, but grows with less vigor than either.

The New Zealand and Ohio or northern strains of White Dutch are not recommended, as all have made a small, dwarfy growth.

Red Clover

Six strains of red clover have been under test, and all produced excellent growth. Strains included Kenland, Midland, Tennessee Purple, Louisiana red, and Louisiana synthetic 1 and 2. A vigorous growth was obtained and two or three hay crops could have been harvested. The Kenland and Louisiana strains showed up particularly well. Red clover offers great possibilities for use in our pasture program, particularly where planted with oats for hay or pasture.

Crimson Clover

Crimson clover has performed well in the hill land or sandy-land soils and in some cases in the Red River Valley area. It makes a vigorous growth and produces an abundance of seed. After several years of planting various strains and varieties, re-seeding was obtained during the fall of 1951 on all varieties for the first time. This of course does not clarify its place in the Red River Valley area.

Varieties included in the test were Auburn, Autauga, Talledega, Dixie, Common and Mississippi Selection. Of these varieties, the Autauga produced blooms and matured seed first, followed by Auburn and then all other varieties.

Miscellaneous Legumes

Other legumes, alsike, black medic, hop clover, Persian clover and sub clover, were included in the test. Alsike clover makes excellent growth and is adapted to low lying areas more than white Dutch. It survives droughty conditions satisfactorily. Persian clover grows vigorously, crowding out all other clovers, but goes out rapidly in early summer. Sub clover grows vigorously but is susceptible to Sclerotium (a fungus disease) that may reduce the stand. Its place as a grazing crop is doubtful. Black medic makes satisfactory growth, but its use in a pasture program is doubtful because of its lack of vigor in growth habit, and it goes out in early summer. Hop clover is not adapted to soils of the Red River Valley, as it is generally adapted to soils acid in reaction.

All of the above legumes except alsike clover go out by late spring or early summer and lack the vigor of the white clover.

—*J. Y. Oakes, L. L. McCormick, and W. A. Nipper*

Animal Industry

Pasture Studies

Because of the rapidly expanding beef cattle industry in Northwest Louisiana, there is a growing demand for more information on grasses and clovers for the production of better pastures. Even though we are constantly experimenting with new varieties and strains of grasses and legumes, much time is being devoted to making the most of grasses and legumes common to the Red River Valley area.

One of the greatest problems confronting us at the present time is finding a combination that can be used to supplement permanent pastures for a year-round grazing program. Both supplemental and permanent pasture plots are included in the pasture program.



Kentucky 31 fescue grass and Ladino or white Dutch clover produce excellent pastures for spring, summer and winter use.

Five pasture mixtures, each replicated twice, were used for these experiments, and each pasture was five acres in area. The crop or crop combinations were: (1) Kentucky 31 fescue and Ladino clover; (2) Kentucky 31 fescue and white Dutch clover; (3) oats alone followed by Johnson grass and Sudan grass; (4) red clover, rye grass, oats, vetch, and Singletary peas followed by Johnson grass; and (5) oats and Singletary peas followed by Johnson grass and Sudan grass.

The Kentucky 31 fescue and Ladino clover, and the Kentucky 31 fescue and white Dutch clover were grazed from March 26 until August 13, and from October 15 to December 10. One plot of oats alone followed by Johnson grass and Sudan grass, only provided grazing from March 27 until June 18. Grazing was then

discontinued on these plots so Sudan grass could be planted and was not resumed until July 16. They were grazed until October 8 with adequate grazing provided. The probable reason the plot, where oats alone was used, furnished this much grazing was because a good stand of Singletary peas came up on about half of the plot. The other plot of oats alone followed by Johnson grass and Sudan grass only furnished grazing from March 26 until April 23 and from July 16 until October 8. The plots containing red clover, rye grass, oats, vetch, and Singletary peas followed by Johnson grass provided grazing from March 26 until October 8.

All cattle were wormed before the experiment began. Cattle were sprayed, when needed, to control flies. Minerals and salt were fed free choice on all plots.

The information obtained from this test is as follows:

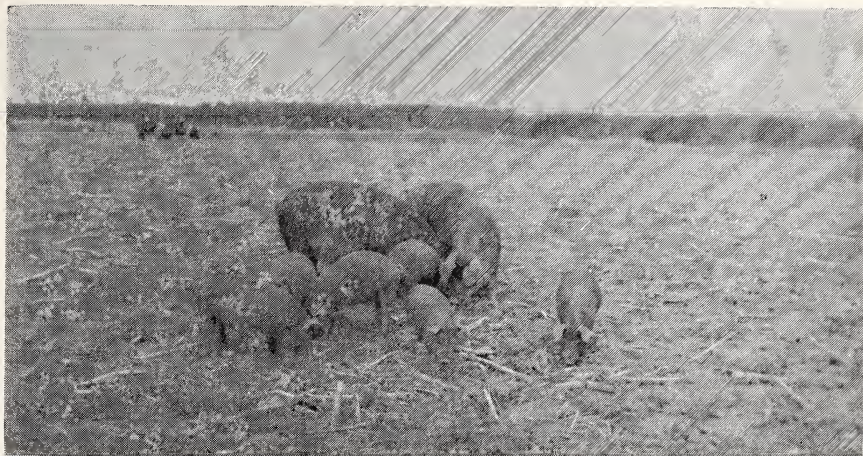
Pasture Combinations	Cows Per Acre	No. Days Grazed	Av. Daily Gains	Gains Per Acre
1. Kentucky 31 fescue & Ladino clover	1.6	196	1.51	517
2. Kentucky 31 fescue & white Dutch clover	1.6	196	1.53	531
3. Oats, Johnson grass & Sudan grass	1.0	140	1.31	194
4. Red clover, rye grass, oats, vetch, Singletary peas & Johnson grass	1.0	196	1.48	281
5. Oats, Singletary peas, Johnson grass & Sudan grass	1.0	168	1.68	286

—*W. A. Nipper and J. Y. Oakes*

Production Cost of Feeder Pigs

During the last two years a shortage of feeder pigs has existed throughout the state. It is important that feeder pigs be available when needed and that they be of high quality for use in hogging off corn and soybeans. One way to get choice pigs is to raise them.

Results obtained from the first years' work, where feeder pigs were grown, indicate that a nice profit was made from them by finishing them for market on corn and soybeans. Pigs were grown from spring litters at a cost, including feed, vaccines and worming, of \$11.38 per hundred. Feed prices were based on local market prices at time pigs were fed. The same quality feeder pigs were selling on the local market at 18 to 24 cents per pound. The cost of labor and purchase price of the sows were not included. No return was figured for the increased value of the sows. The pur-



High quality feeder pigs grown at a cost of \$11.38 per hundred for hogging off corn and soybeans.

chase price of the sows will be deducted from the fall litters of pigs when sold, which will offset their original purchase price.

—*W. A. Nipper*

Hogging Off Corn and Soybeans

The second year of this practice has been completed. The test was changed somewhat during 1951 to include more viney type soybeans. Previous experiences of this Station and others showed that the hogs invariably ate the leaves before starting on the beans themselves. In order to check these observations, the soybeans were mixed at the ratio of 1/3 rather late maturing, viney type with 2/3 medium early soybeans that produce an abundance of beans.

Four acres of corn and soybeans were interplanted, with one acre to an early hybrid corn, Funk's G-50, and mixed S-100 and Ogden soybeans. Two acres were planted to a late maturing hybrid corn, Dixie 11, 1/3 Improved Pelican and 2/3 Ogden soybeans. The last acre was planted to the same variety of corn but Improved Pelican soybeans were used. The four acres were fenced and cross fenced in order to hog off from the early to late maturing varieties.

Feeder pigs grown on the station were used. They had been vaccinated, wormed and adequate minerals provided so they would enter the test in good shape. After the pigs were turned on the corn and soybeans, shade, water, tankage and minerals were provided. The tankage and minerals were hand fed.

Three hundred ninety-one pounds of corn with green soybeans produced 100 pounds of pork. This was slightly higher than

in 1950 and may have been due to the use of soybeans that produced more beans than foliage during that year, instead of a more viney type one during 1951. This seems to indicate that hogs make more economical gains when an ample amount of green beans is present on the plants. A greater net return was obtained in 1951 than in 1950 because the feeder pigs had been grown on the Station at a cost of \$11.38 per hundred as compared to \$18.43 when purchased in 1950. The average selling price was \$19.78 per hundredweight.

A net profit of \$211.26 per acre was realized after deducting cost of pigs, tankage, minerals and salt. This represented \$3.49 per bushel for the corn in the field when utilized through hogging off. —*W. A. Nipper and L. L. McCormick*

Rice Experiment Station, Crowley

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Experimental studies on rice drying and storage, rice fertilization, forage crop fertilization, pastures, supplemental grazing, and rice varieties were conducted by personnel of the Rice Experiment Station.

In addition to the above studies various departments at the Louisiana State University conducted research studies at the Rice Experiment Station. These departments and lines of investigation were as follows: Agronomy — soil physics; Agricultural Chemistry and Biochemistry — factors influencing protein content of rice; Entomology — rice insects; Plant Pathology — seed treatment, white tip, and other disease studies.

The Rice Experiment Station cooperated with the U. S. Department of the Interior, Geological Survey in a project to determine water requirements for rice irrigation.

A cooperative project between the Rice Experiment Station and the Southern Regional Research Laboratory to determine the effects of heat and certain other factors on the microbiology of rice was carried on again in 1951.

Hundreds of foreign visitors, mostly from Asiatic rice growing countries, spent varying degrees of time at the Rice Experi-

ment Station during the year. Most of these visitors were under the sponsorship of the U. S. State Department.

Summaries of the most important projects conducted by members of the staff of the Rice Experiment Station are presented below.

Rice Drying and Storage

Long-Time "On the Farm" Storage of Dried Rough Rice

Experimental studies were started in 1949 to determine: 1. The best types and materials of construction of rice storage bins. 2. The safe moisture levels and lengths of time rough rice can be stored. 3. Proper insect control.

Data were accumulated from rice of the 1948 and 1949 crops during storage and from 1950 crop rice still in storage. The 1950 crop rice has been in storage since November, 1950, without turning or aeration. Some of the bins indicate no deterioration while others show loss in germination and/or grade. Indications are that: 1. Rice stored in wood, steel, and concrete stave bins has shown no differences that were due to construction material. 2. The maximum moisture content for safe storage for any length of time in bulk is 13 to 13½ per cent. 3. Insects can be effectively controlled by fumigation and use of insecticides.

Temporary Storage of Undried Rice

This study has been in progress for three seasons and was stimulated by the problems encountered by combine harvesting. Normally, about 40 per cent of the total rice crop in Louisiana is harvested in a two weeks period, and present drying facilities are not adequate to handle the incoming rice. This has resulted in depressing the price and lowering the quality of the grain. These studies were made with a glass lined, hermetically sealed bin and three bins in which aeration systems were installed.

Glass Lined Bin—In each of three tests conducted, the germination of the seed at the end of storage was very low. A sour odor was also formed that could not be removed in every case. As these two conditions lower the quality of the grain, it has been decided to search for other methods of temporary storage for next year's study.

Aeration in the Bin—Four lots of rice were aerated during the 1950 season and two during the 1951 season. Five of the six lots showed little or no deterioration and the other showed some heat damaged kernels. This seems to be the most practical method, but more data needs to be obtained to determine: (1) maximum depth of storage, (2) length of storage before deterioration starts,



Part of the bin drying facilities at the Rice Experiment Station.

(3) volume of air required per bushel of rice, (4) best type of duct system or false floor, (5) hours of operation per day, (6) approximate cost of operation, (7) whether reversal of air flow will prevent stratification of moisture levels.

Rice Drying "On the Farm"

The farmer who can dry and store his own rice on the farm has several advantages over the average farmer. Some of these advantages are: 1. He can harvest at optimum grain and weather conditions. 2. He does not have to haul it to a drier and then back to the farm for storage if he does not wish to sell. 3. He can sell when he believes the price is highest. 4. Most farm drier owners report that they can operate their own driers cheaper than they can have their rice dried in a commercial drier. Some of the larger farmers have gone to the commercial type drier but the average farmer can not afford the expense of this type. Work was started in 1950 to determine if rice could be dried in the bin with heated air.

During the 1950 season three lots of rice were dried with heated air and three more lots were dried during the 1951 season. In almost every case the moisture content at the bottom of the bin was below 7 per cent by the time the top of the bin was below 14 per cent. This low moisture content was raised in some cases by blowing unheated high-humidity air through the rice. In some

cases, a very low milling quality was obtained from the bottom layers of rice. There was no indication that germination was damaged at the temperatures used (127° F maximum rice temperature).

Data will be obtained in 1952 to try to determine: 1. Methods of operation to minimize low moisture content and stratification of moisture levels. 2. Optimum operating temperatures. 3. Length of drying time and whether drying should be intermittent or continuous. 4. Cost of drying rice in the bin.

Data to date indicate that seed rice can be dried in the bin if the farmer wishes to take some loss of weight due to over drying.

—L. G. Coonrod, H. T. Barr, and R. K. Walker

Fertility Studies: Rice

The Effect on the Yield of Rice from the Application of Different Amounts and Combinations of Nitrogen, Phosphorus, and Potassium

Drilled Rice—*Farm of Norbert Lejeune, Oberlin, La.*—This was an outfield experiment established near Oberlin, La. on a sandy loam soil. The variety of rice was Bluebonnet. This test included all possible combinations of three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P_2O_5 per acre), and three rates of potassium (0, 20, and 40 pounds of K_2O per acre). All three elements applied as fertilizer gave a significant difference in rice yield. However, the application of nitrogen gave a negative result. The explanation seemed to be associated with the poor stand and grass competition resulting from the nitrogen application. Phosphorus applications resulted in a significant increase in rice yields. Those plots which received no phosphorus produced 12.3 barrels per acre; 20 pounds of P_2O_5 resulted in a yield of 15.3 barrels per acre. There was no significant difference between the 20-pound and 40-pound rate of application of P_2O_5 . The application of potash resulted in an increased rice yield. The 20 pounds of K_2O per acre application resulted in a 19.3 per cent increase over the plots which received no potash. The 40-pound application resulted in a 15.5 per cent increase over the plots receiving 20 pounds of K_2O per acre. Yields were as follows: no potash — 11.9 barrels per acre; 20 pounds of potash per acre — 14.2 barrels per acre; 40 pounds of potash per acre — 16 barrels per acre.

Drilled Rice — *Rice Experiment Station*—A fertilizer test consisting of 27 different rates and ratio combinations was conducted at the Rice Experiment Station. The variety of rice planted was Bluebonnet. This test included all possible combinations of three rates of nitrogen (0, 20, and 40 pounds of N per acre), three

rates of phosphorus (0, 20, and 40 pounds of P_2O_5 per acre), and three rates of potassium (0, 20, and 40 pounds of K_2O per acre). The fertilizers were applied at the time of seeding.

The application of phosphorus gave a significant increase in yield. The plots with no phosphorus application yielded 28.4 barrels per acre; those plots receiving 20 pounds of P_2O_5 per acre yielded 31.4 barrels per acre; and those plots receiving 40 pounds of P_2O_5 per acre yielded 30.2 barrels per acre. The increase in yield was significant between the 0 and 20-pound rate of application but not between the 20 and 40-pound rate of application. This is in agreement with the results obtained during 1950.

Neither nitrogen nor potash application gave a significant increase in rice yields.

Water Planted Rice—This test was conducted at the Rice Experiment Station. The test consisted of 27 different rates and ratio combinations on water planted Magnolia rice. This test included all possible combinations of three rates of nitrogen (0, 20, and 40 pounds of N per acre), three rates of phosphorus (0, 20, and 40 pounds of P_2O_5 per acre), and three rates of potassium (0, 20, and 40 pounds of K_2O per acre).

The application of nitrogen resulted in highly significant increases in yield. This was in agreement with previous tests. The plots receiving no nitrogen resulted in an average yield of 15.8 barrels per acre. The 20-pound application of nitrogen per acre resulted in an average yield of 17.7 barrels per acre. The 40-pound application of nitrogen resulted in an average yield of 20.2 barrels per acre.

Even though statistically the application of phosphorus failed to produce an increase in rice yield, the trend of increase is in agreement with the results obtained in 1950. Previous experiments have shown that greatest increases in yield were obtained from phosphorus when the application was made at the time of seeding or in the early life of the rice.

The application of potash failed to give an increase in rice yield, which corresponds with the results obtained in 1950.

The method of handling the water after planting had a significant effect on the yield of rice. The average yield for the area where the water was removed five days after seeding was 16.6 barrels per acre. Where the water remained on the area until harvest the average yield was 19.2 barrels per acre.

Sources of Nitrogen—Equivalent amounts (30 pounds of N per acre) of nitrogen were applied from different sources in an effort to better determine the best sources of nitrogen material for rice. The following sources of nitrogen were used: sodium nitrate, ammonium sulfate, ammonium nitrate, urea, anhydrous

ammonia, ammophos, cyanamid, and ammonium chloride. All materials were applied just prior to or at seeding of Bluebonnet rice. The average yields obtained from the application of different sources were: sodium nitrate—33.5 barrels per acre; ammonium sulfate—33.1 barrels per acre; ammonium nitrate—30.9 barrels per acre; urea—33.1 barrels per acre; anhydrous ammonia—29.5 barrels per acre; ammophos—28.3 barrels per acre; cyanamid—6.6 barrels per acre; ammonium chloride—29.9 barrels per acre; check plots—29.5 barrels per acre. Blanket applications of phosphorus and potash were applied at the rate of 40 pounds of P_2O_5 per acre and 40 pounds of K_2O per acre, respectively. There was no difference between average yields with the exception of the yield obtained from the cyanamid application. In comparing the rice plots during the growing season, the plots receiving nitrogen in the ammonia form were further advanced and more vigorous.

Drilled Rice—Different amounts of nitrogen and phosphorus and different times of application for nitrogen—This test included all possible combinations of three rates of nitrogen (15, 30, and 45 pounds of N per acre), three rates of phosphorus (15, 30, and 45 pounds of P_2O_5 per acre), and three conditions of applying nitrogen (all at seeding, $\frac{1}{2}$ at seeding + $\frac{1}{2}$ as top-dressing, and all as top-dressing). Blanket applications of potash were applied to the area at the rate of 40 pounds of K_2O per acre. There was a highly significant difference between the yield obtained from the check plot and the yield obtained from plots receiving fertilizer. Average yield received from the fertilizer plots was 32.0 barrels per acre. Average yield received from the check plots was 24.8 barrels per acre. There was some difference in yield between the rates of nitrogen material applied but not as great as would normally be expected. The higher rates of phosphorus application did not increase the rice yield.

The time of application for the nitrogen material resulted in significant differences in rice yields. On this soil the application at the time of seeding gave the highest yields. An average yield of 33.6 barrels per acre was obtained from plots receiving all the nitrogen at the time of seeding. For the split application, one-half at seeding and one-half as top-dressing, the average yield was 31.7 barrels per acre. Where all the nitrogen was applied as top-dressing, the average yield was 30.6 barrels per acre.

Drilled Rice—Time of application for nitrogen and phosphorus—The purpose of this test was to determine the effect on the yield of rice from the application of 30 pounds of nitrogen (N) and 30 pounds of phosphorus (P_2O_5) at different periods of time after emergence. All of the fertilizer was applied as top-dressing. This test included all possible combinations of six different times for nitrogen application (10, 20, 30, 40, 60, and 100 days after

emergence) and four different times for phosphorus application (10, 20, 40, and 60 days after emergence).

The time of phosphorus application was the only treatment which affected the yield of rice. Application of phosphorus at 10, 20, 40, and 60 days after emergence resulted in 26.1, 26.4, 25.6, and 22.8 barrels per acre, respectively.

All of the above tests at the Rice Experiment Station were established on land which was planted to oats for two years and then fallowed for three years prior to seeding rice. This condition explains to some extent the extremely high yields recorded.

—*R. J. Mears, M. B. Sturgis, and R. K. Walker*

Fertility Studies: Forage Crops

During the winter of 1950-51 eight fertility tests on winter grasses and legume mixtures were established and clippings made to determine amounts of green forage produced. The following mixtures were seeded: rye grass and alsike clover, oats and crimson clover, oats and alsike clover, rye grass and crimson clover, fescue and crimson clover, and fescue and alsike clover. Then one test was established for oats and one for rye grass. All tests were of randomized factorial design. Clover stands were extremely poor and little or no growth was obtained. Sufficient growth was not produced on the fescue plots to make clippings.

All tests responded to high nitrogen and phosphorus applications. The high rate of 80 pounds of nitrogen (N) and 80 pounds of phosphorus (P_2O_5) resulted in significant increases over the lower rates. Potash applications did not result in higher yields.

Kobe Lespedeza Fertilization—This is the second year in which this test has been established at the Rice Experiment Station. The field design was a randomized factorial test with two rates of nitrogen (15 and 30 pounds per acre), three rates of phosphorus (40, 80 and 120 pounds of P_2O_5 per acre), and three rates of potash (0, 40, and 80 pounds of K_2O per acre).

This test was in agreement with the test of 1950 in that the greatest increase in forage was due to the application of phosphorus. Phosphorus applications at the rate of 40, 80, and 120 pounds of P_2O_5 per acre resulted in yields of 4373, 4747, and 5547 pounds per acre, respectively.

Other Forage Crops—During the winter of 1951 and 1952 five fertilizer tests were established at the Rice Experiment Station. All tests were of randomized factorial design which included three rates of nitrogen (20, 40, and 80 pounds of N per acre), three rates of phosphorus (20, 40, and 80 pounds of P_2O_5 per acre) and three rates of potash (0, 40, and 80 pounds of K_2O per acre). Clippings will be made on Southland oats, Atlas wheat, and

rye grass to determine green weight forage yields. Two tests will be harvested for grain yields. These are Alber oats and Atlas wheat.

—*R. J. Miears, D. E. Black, M. B. Sturgis, and R. K. Walker*

Pasture and Forage Studies

Pasture-Rice Rotation

The pasture-rice rotation experiments were continued in 1951 and continue to show the high value of improved pastures for increasing beef yields and increasing rice yields following improved pastures. Beef yields on all pastures were considered low because of a severe drought during the summer and fall. Records at this station show total rainfall for 1951 to be 36.64 inches as compared to a thirty-one year average (1910-1942) of 57.38 inches per year.

There were three locations of these rotation experiments in various stages of completion on the different soil types of the rice area. One experiment was completed at Karl Goebbel's farm, Elton, La., and the second consecutive rice crop following two years of improved pasture produced 15.28 barrels per acre as compared to 14.01 barrels per acre for the check pasture. This difference is not nearly as large as has been found in previous experiments.

Beef yields on third-year improved pastures at the E. O. Daughenbaugh farm, Lake Charles, La. were 227 pounds per acre as compared to 49 pounds per acre for the check pastures. Second-year pastures at the Rice Experiment Station produced 284 pounds of beef per acre as compared to 60 pounds per acre for the check pastures.

Winter Pasture Test

A winter pasture test was started in the fall of 1950 for the purpose of determining the beef producing capacity of various winter grasses. The treatments were as follows: (1) oats alone, (2) rye grass, (3) fescue and crimson clover, (4) fescue and alsike clover. The highest beef production per acre was on rye grass, which was 166 pounds, followed closely by oats with 154 pounds per acre. Fescue and crimson clover produced 117 pounds while fescue and alsike produced only 100 pounds per acre. A freeze on February 1 caused severe damage to the oats and resulted in low beef yields on these pastures.

Grasses and Legumes

In the white clover test, Louisiana Synthetic No. 1 and No. 2 continue to show higher forage yields than Louisiana white Dutch clover and Ladino. In a test of twelve summer grasses, Pangola

has produced the highest amount of forage, followed closely by Coastal Bermuda. Because both Pangola and Coastal Bermuda are propagated vegetatively, their use in the rice area may be limited to acreage that is not used for rice production, because of expense involved in transplanting.

Kobe lespedeza produced the highest yield in 17 entries in a lespedeza lot and variety test. It consistently outyielded all entries of common lespedeza. In three years of planting at this station, Korean lespedeza has not shown much promise for growing in this area. Fifteen acres of Louisiana Synthetic No. 1 white clover and eight acres of Dallis grass strain B-230 are currently being grown for release to farmers who are interested in growing certified seed.

Wheat Production

Two new rust resistant varieties of soft winter wheat, Coastal and Atlas 66, were successfully grown at this station in 1949 and 1950. These varieties appear to have definite possibilities for use as a winter grazing crop, and for the production of grain to be used as supplemental feed for livestock. Atlas 66 has produced an average of 26 bushels per acre for two years. This is well above the U. S. average. Since we have not been able to grow a concentrate feed in this area before, there is widespread interest among farmers and drier operators in this wheat. It can be planted, harvested and dried, when necessary, with machinery and equipment presently available to the rice farmer and is grown at a time of the year when their labor and machinery are not otherwise being used.

There have been approximately 1500 to 2000 acres planted in the rice area this year and reports to date indicate that farmers are very well pleased with this crop. It is currently being used in a winter pasture test along with oats, rye grass and fescue.

Southland Oats

The Southland oat was developed by the Florida Experiment Station and first plantings were made at this station in the fall of 1949. It appears to be particularly desirable for winter grazing because of its earliness, broad leaves, crown rust resistance, upright growth and high forage producing capacity. Because of its early, fast growth it is subject to freezing injury, particularly if early plantings are made. In 1950 this oat made the highest grain yield in oat variety tests at this station; however, yields were very low in 1951 because of severe damage by a freeze on February 1. Camellia and Alber oats have been replaced by this variety in pasture-rice rotation experiments and in winter pasture tests at this station. —*D. E. Black and R. K. Walker*

Foundation Seed Rice Program

The Rice Experiment Station is the producer of foundation seed for the certified seed rice program in Louisiana. In 1951 a total of 965 barrels of five different varieties was distributed to 78 farmers in the rice producing parishes. The five varieties and the number of barrels of each were as follows: 79 barrels of Magnolia, 76 barrels of Zenith, 115 barrels of Century, 252 barrels of Bluebonnet, and 443 barrels of Rexoro.

The following machinery was used in cleaning the foundation seed: the Clipper Seed Cleaner, the Superior Seed Cleaner, and the Dockins' Seed Grader.



Combining foundation seed rice at the Rice Experiment Station.

The approximate amounts of foundation seed to be distributed in 1952 are: 204 barrels of Zenith, 61 barrels of Magnolia, 146 barrels of Century, 256 barrels of Bluebonnet, and 10 barrels of Rexoro. —*Charles N. Bollich and R. K. Walker*

Rice Breeding and Variety Testing

The objective of the rice improvement work of the Rice Experiment Station is to develop and make available to growers better early, midseason, medium-late, and late maturing medium- and long-grain varieties. Growers prefer early maturing varieties because they require less irrigation water and may be seeded

either early or late. Long-grain rice of good quality brings a higher price than does medium-grain rice, but there is a demand for both types. Yielding capacity, disease resistance, adaptation to the combine-drier method of harvesting, milling quality, and cooking quality are other important characters desired in improved varieties.

It requires from 12 to 15 years to develop and increase an improved variety for distribution. Consequently, the development of special types to meet changing conditions must be started long in advance of popular demands.

Rice breeding must be continuous. Crosses are made each year to facilitate studies on the inheritance of characters and the selection of promising pure lines. The selections are subjected to nursery row-plot and field-plot tests in comparison with standard varieties, and the better strains are increased for distribution. In 1951 the rice improvement experiments were conducted in one field on the new Rice Experiment Station northeast of Crowley. Three fields are available so that each area will be in rice only once in 3 years. This will permit the maintenance of a higher level of productivity than was possible when alternate cropping was necessary.

The number of drill-strip field-plot experiments was reduced from four to three because at the present time no midseason to medium-late varieties are being grown. Blue Rose belonged in this maturity group, but has practically disappeared. The yields obtained in 1951 were considerably higher than those of previous seasons because the experimental area had not been in rice for 5 years. The average yield for the early group was 24.6 barrels per acre—nearly 4,000 pounds. The midseason varieties averaged 23.0 barrels and the late 16.9 barrels per acre. The reason for the lower yield of the late varieties is not clear. Yields of Zenith, Magnolia, and Century Patna were among the highest in the early group. A selection from Rexoro x Zenith, which is a few days earlier than Zenith, also gave a high yield. Its grain was of better quality than that of Century Patna, but the grain is thicker than that of Century Patna or Rexoro.

In the midseason group the stands of Fortuna, Bluebonnet, and Bluebonnet 50 were poor. The highest yields were obtained from an unreleased Bluebonnet selection, from the Rexoro back-cross Selection No. 4-II-I-8, and from Century 52. Improved Bluebonnet and its sister selection R-N were among the varieties showing considerable susceptibility to stem rot.

The leading variety in the late group was an unreleased selection from the cross Rexoro x Delitus. This is a flavored or "scented" variety. Its grain is rather chalky and the milling quality poor. Texas Patna and Rexoro produced higher yields than did

Texas Patna 49 ("Stiff-strawed Patna"), Rexoro x Purple Leaf, and several selections from Rexoro backcrosses.

Four unnamed varieties were grown cooperatively by farmers to provide sufficient rice for tests of milling quality on a commercial scale, and also to obtain the farmers' and buyers' reaction to these new varieties. The varieties grown included:

(1) Blue Rose backcross Selection No. 6-I-25-12 (known as "3/4ths Blue Rose"). This selection matures a few days later than Blue Rose, and when seeded early it matures after Bluebonnet and before Rexoro; thus it fits into the planting and harvesting schedule very well. It has the disease resistance, stiff straw, smooth hull, and uniform maturity desired for successful combining and drying. The grain is of Blue Rose type but somewhat smaller. Considerable interest was shown in this selection by both growers and millers, but unfortunately the grain showed a tendency to check, resulting in low head rice yields when milled.

(2) Rexoro x Purple Leaf, Selection No. 3-72-3. Seed of this selection was not distributed in 1951, but two farmers continued to grow it on some of the heavier soils. Its milling quality is excellent, but it is not in demand for it has a thicker grain than Bluebonnet and does not fall into any class familiar to the trade.

(3) Rexoro x Delitus, C. I. No. 8143, is a flavored (scented or aromatic) variety and may be classed as a food specialty. One grower is attempting to develop a trade outlet for rice of this type.

(4) A Rexoro backcross, Selection No. 7/8-Rex.-3-12, was distributed to two cooperating growers for observation. This selection is resistant to the *Cercospora* leaf spot and appears less subject to lodging before it is mature than does Rexoro. Otherwise it is very similar to Rexoro.

A 20-acre increase field of the Rexoro backcross Selection No. 4-II-1-8, was grown on the Station. This selection is similar to Bluebonnet and appears to be superior to Bluebonnet in many respects, but it has more slender straw and, at higher fertility levels, it lodges. No release will be made at present.

About 5 acres were used for the increase of the Rexoro backcross Selection No. 7/8-Rexo-3-12, and a similar area for an increase of the Blue Rose backcross Selection No. 6-I-25-12.

Smaller increases, ranging from about one-half to one acre each, were grown of five other varieties and selections: Century Patna 231, Bluebonnet Selection, Texas Patna Dwarf Natural Cross, and two Rexoro backcrosses. The Bluebonnet selection appears to give better stands and milling quality than the original.

Four of the eight varieties reported by name as in production in Louisiana in 1951 were released from the Rice Experiment Station. Over 26 per cent of the acreage was seeded to these four varieties. Rexoro was sown on 21.1 per cent, Magnolia 4 per cent,

Fortuna 1.1 per cent, and Nira 0.4 per cent of the acreage. In Texas, Rexoro and Texas Patna together occupied 40 per cent of the acreage.

Varieties recommended for general production in Louisiana in 1952 include Zenith, Magnolia, Century Patna 231 (matures slightly later than Zenith), Century 52 (matures about a week later than Zenith and a week earlier than Bluebonnet), Bluebonnet, Bluebonnet 50 (especially on more fertile soil because of its shorter straw), and Rexoro. —*N. E. Jodon*

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Pasture Studies with Dairy Cattle

Summer Pastures

Pearl or cattail millet continues to be the outstanding summer supplementary grazing crop. This crop has the following advantages over Sudan grass: 1. When planted at the same time as Sudan grass, millet will provide grazing one week to ten days earlier. 2. When grazed off it will recover and be ready for grazing before Sudan. 3. No foliage diseases have been in evidence on millet; this is not true of Sudan grass. 4. Danger from prussic acid poisoning is nonexistent in millet.

Winter Pastures

Winter pasture experiments consist of combination studies. The following combinations are currently under trial: 1. Oats alone. 2. Oats-crimson clover (reseeding). 3. Oats-Singletary peas. 4. Rye grass on Dallis grass sod. 5. Rye grass-crimson clover (reseeding). 6. Tall fescue on Dallis grass sod. 7. Tall fescue alone. 8. Tall fescue-ladino clover. 9. Tall fescue-white Dutch clover. 10. Tall fescue-crimson clover (reseeding). 11. Control; the animals assigned to this group were dry lot fed all the hay and silage they would clean up. They did not have access to pasture at any time.

All of these combinations were seeded during the latter part of September, 1950, except treatment No. 6, which was seeded in

¹Transferred from North La. Hill Farm Experiment Station July 1, 1951.

²Transferred from North La. Hill Farm Experiment Station June 18, 1951.

September, 1949. All pastures were limed and fertilized with 300 pounds of 6-8-8 fertilizer per acre before planting. Two nitrogen top dressings were made during the grazing season, the first on November 29 in the amount of 48 pounds of nitrogen and the second on January 23 in the amount of 56 pounds of nitrogen. Grazing periods, pounds of milk produced per acre, and value of milk per acre above feed and pasture costs are shown in the accompanying table.

Treatment	Grazing period	Total lbs. milk prod. per acre	Value of milk per acre above feed & pasture costs
Oats alone	12/16 - 1/31		
	3/10 - 5/4	2,023	\$ 34.69
Oats-crimson clover	12/16 - 1/31		
	3/10 - 5/4	2,158	37.21
Oats-Singletary peas	12/16 - 1/31		
	3/10 - 5/4	2,103	34.24
Rye grass on sod	12/20 - 5/4	1858	48.44
Rye grass, crimson clover	12/16 - 1/31		
	2/16 - 5/4	3,582	105.71
Fescue on sod	1/27 - 1/31		
	2/17 - 5/4	1,794	48.99
Fescue alone	2/20 - 5/4	1,466	17.11
Fescue-Ladino clover	2/20 - 5/4	1,222	—1.49
Fescue-white Dutch clover	2/20 - 5/4	1,387	7.69
Fescue-crimson clover	2/20 - 5/4	1,350	19.24

It may be observed from the table that the rye grass-crimson clover combination provided the greatest net return above feed and pasture costs. This combination in previous years has been among the top two or three, and this year it was outstanding in comparison. The winter of 1950-51 was a very severe one, and it is gratifying to know that rye grass-crimson clover will perform satisfactorily in unfavorable as well as favorable seasons. The fescues perhaps should not be judged too severely at this point since they are first-year seedlings. Indications are, however, that the fescues are not adapted to the soils typical of this area.

Permanent Pastures

Permanent pasture experiments consist of a study of rates of nitrogen for a Dallis grass-white Dutch clover-common lespedeza pasture. The rates are as follows: 1. No nitrogen. 2. 64 lbs. nitrogen annually (32 lbs. June 1, 32 lbs. July 15). 3. 96 lbs. nitrogen annually (32 lbs. June 15, 32 lbs. August 1, 32 lbs. Sept. 1). 4. 128 lbs. nitrogen annually (32 lbs. June 1, 32 lbs. July 15, 32 lbs. August 15, 32 lbs. Sept. 15). All of these pastures receive 50 pounds of potash and 60 pounds of phosphate annually.

One year's results provide no significant difference in total

milk production per acre regardless of the amount of nitrogen top-dressed. It appears, therefore, that if permanent pastures, under a non-irrigated system of management, are to be top-dressed with nitrogen fertilizer this top-dressing must only be made at a time when soil moisture conditions are favorable for plant growth.

Corn

Yield Testing

A total of 36 open-pollinated and hybrid corns, having yield ranges of 36-56 bushels per acre, were included in this test. The top yielding entries in descending order of production were La. 9102, Funk's G-791W, Coker's 811, Dixie 11 and La. 521. The top yielding hybrids produced approximately 20 per cent more corn than the top yielding open-pollinated varieties.

Nitrogen X Spacing

Spacings varied from 12 inches to 30 inches in 6-inch increments. Total nitrogen application varied from 30 pounds to 158 pounds in 32-pound increments. Eighteen-inch spacings with 30 pounds of nitrogen applied at planting and 64 pounds applied as side-dressing gave the highest yields. This was the second year of this test. The same trend occurred in the first year.

Fertilization

This is the third year this experiment has been in progress, and it continues to demonstrate quite forcibly that there is a need for higher levels of phosphate fertilization on these soils. Little response continues to be exhibited from the application of potash fertilizer. A few citations will bear out these points:

	0-0-0	plus 48 lbs. N	—20 bushels
600 lbs.	8-0-8	plus 48 lbs. N	—19 bushels
600 lbs.	8-8-8	plus 48 lbs. N	—47 bushels
600 lbs.	8-8-0	plus 48 lbs. N	—43 bushels
600 lbs.	0-0-8	plus 48 lbs. N	—17 bushels

Tung Meal as a Fertilizer Material

This experiment has been in progress for three years. The purpose is to determine if there is any toxic material present in tung meal, and if not, its value as a fertilizer material when applied to corn. The test is set up so that none to all of the total nitrogen applied is obtained from tung meal. No toxic effect has been demonstrated; also the yields produced by those treatments obtaining part or all of their nitrogen from tung meal have been greater than the yields from the treatments where all of the ni-

trogen was obtained from commercial sources. Tung meal, however, must be supplemented with phosphate fertilizer if satisfactory yields are to be obtained. The following bears out this statement: Two thousand pounds of tung meal plus 300 pounds of 0-8-8 produced 53 bushels of corn as compared to 37 bushels from 2,000 pounds of tung meal plus 300 pounds of 0-0-8.

Cotton

A total of eighteen commercially available cotton varieties, having a yield range of 1,517 to 979 pounds of seed cotton per acre, are included in this test. The top yielding entries in descending order of production are as follows: Fox, Hybrid 56-4-M, Delfos 8274, Cokers 100 Staple, and Miller A.

Sorghum

Eighteen forage and combine type sorghums were obtained from breeders and planted in an increase nursery in order that seed might be obtained for more extensive trial next year. Some of the combine types appear particularly promising.

Alyce Clover Fertilization

As a result of three years tests the use of eighty pounds of phosphate plus 40 to 50 pounds of potash appears to be the most profitable fertilizer for Alyce clover.

Peach Variety Testing

One of the major problems in peach production in the southern area of the state is that we do not have sufficient hours of cold weather, 45° F. or lower, in the winter to break the rest period to enable the trees to begin normal spring growth for a crop of fruit. A planting of 40 varieties was made in February, 1950, to determine if there were varieties available that were adapted to conditions in this area. Most varieties in the planting require a low number of hours of temperature 45° F. or below. However, a limited number of varieties as Elberta were included for comparison.

Most varieties made excellent growth during the first two growing seasons. Some varieties produced a few fruits the second growing season. Additional years of study will be required before definite varietal recommendations can be made.

—*P. L. Hawthorne* and H. D. Ellzey, Jr.*

*Associate Horticulturist, L.S.U.

Calf Feeding

The purpose of this experiment is to determine to what extent reconstituted skim milk powder can be substituted for whole milk. Accordingly, four groups of Jersey calves were set up as follows: 1. Whole milk for 10 weeks. 2. Whole milk for two weeks and skim milk for 8 weeks. 3. Whole milk for 4 weeks and skim milk for 6 weeks. 4. Whole milk for 6 weeks and skim milk for 4 weeks. The water-skim milk powder ratio used was 1 to 9. Calves were fed milk according to the following schedule:

Weeks of Age	1	2	3	4	5	6	7	8	9	10
Lbs. of milk daily	5	6	7	7	6	6	5	4	3	3

Results of this study indicate that Jerseys should be held on whole milk for at least 4 weeks and preferably 6 weeks before being switched to skim milk powder. Calves on whole milk for 10 weeks appear to be in much better shape than those on whole milk for 2, 4, or 6 weeks at the end of the 10-week period, but at the end of one year there is little difference between the animals in groups 1, 3, and 4.

West Louisiana Experiment Station, DeRidder

CECIL B. ROARK, *Superintendent*

HAROLD E. HARRIS, *Research Associate in Agronomy*

ARCHIE H. MCDANIEL, *Assistant Animal Husbandman*

A Comparison of Different Kinds of Pastures

Eight improved pastures containing different combinations of plant mixtures were fertilized similarly and grazed to capacity in keeping with good management. They were grazed to measure their value in pounds of beef and to determine the period of the year they could be depended upon for good grazing.

These pastures were fertilized with a 50-100-50 fertilizer mixture the year they were planted. After the first year the amount of phosphate applied was reduced and the annual application has been about a 60-60-60 mixture, or the equivalent of 500 pounds of a 12-12-12 fertilizer per acre annually. All pastures were limed in 1948 before planting. Lime was applied according to soil needs as determined by soil analysis. In 1950 basic slag was used as the source of phosphate also to replenish the calcium needs.

In 1951 these pastures were ready for grazing at the rate of an animal unit (equivalent of one cow) per acre by March 1.

The same pastures were grazed at the same rate beginning in mid-January during the mild winter of 1950. Two pastures, one a Dallis grass, white clover, and rye grass mixture and the other a Singletary peas, fescue, and Bermuda grass mixture, gave the longest grazing season. These two pastures were also high in pounds of beef per acre. Some of the early pastures furnished very little grazing after July. These early pastures consisted of fescue grass and clovers. But they furnished heavy grazing during late winter and early spring.

The accompanying table shows the yield of beef per acre from the different pasture mixtures during the grazing season of 1950 and 1951. It also shows the animal days grazed per acre and the daily rate of gain per animal unit during the period grazed.

Annual Production of Beef from Different Kinds of Pasture

Kind of Pasture	Pounds of Beef Per Acre		Animal Days Grazed Per Acre	Ave. Daily Gain Per Animal Unit
	1950	1951	1951	
White clover Dallis grass Rye grass	442	593	223	2.66 lbs.
Singletary peas Fescue & voluntary Bermuda grass	172	570	234	2.44 lbs.
White clover Fescue	370	569	152	3.74 lbs.
Crimson clover Fescue	472	436	116	3.76 lbs.
Ladino clover Fescue	118	383	203	1.89 lbs.
White clover Dallis grass	337	322	159	2.03 lbs.
White clover Dallis grass Fescue drilled on sod	427	331	192	1.73 lbs.
Common lespedeza Carpet grass White clover-fescue Crimson clover-fescue	75*	265	131	2.02 lbs.

* A light crop of fescue seed was harvested.

In this area stockmen graze their pastures primarily with cows and calves. Cows and calves were used in determining the pounds of beef produced in this experiment. Cattle were rotated from pasture to pasture in order to eliminate livestock differences. The cattle were weighed each time they were changed from one pasture to another.



Good cows on plenty of good pasture is good economy.

In 1951 the eight pastures containing 69 acres produced 28,998 pounds of beef, or an average yield of 420 pounds per acre. The average yield for the previous year (1950) was 322 pounds. The average yield for the two years was 371 pounds per acre.

—H. E. Harris, A. H. McDaniel, and C. B. Roark

Forage Crop Studies

Winter Grasses and Legumes—Twenty-four winter legumes and eleven winter grasses were planted to determine their adaptability to the West Louisiana area. Lime and fertilizer were applied to eliminate soil fertility as a limiting factor.

Six strains of white clover were planted alone and in mixtures with Alta fescue. Clippings were made as needed to stimulate growth and to obtain forage yields. Because of the unusually dry season growth was retarded somewhat below normal expectancy. A fair growth was obtained from most of the mixtures. The highest yields were obtained from Certified Ladino, La. Synthetic 2 and La. Synthetic 1 respectively. The La. Synthetic 2 extended over a longer growing period than any of the other strains tested.

Six strains of red clover and eight strains of reseeding crimson clover made good growth. Each showed good reseeding qualities.

In the red clover group Synthetic 1 gave the highest yield while the common variety gave the lowest yield. Crimson clover strains were more uniform in yield.

Of the eleven varieties of winter grasses tested, Italian rye and American rye grass gave the highest yields. In the broom grass test Prairie broom was superior in forage yield and peren-

nial tendency. Orchard grass, Hardin grass and Reed's canary grass made poor growth.

Lespedeza—Eight strains of lespedeza were planted in the spring of 1951. Because of dry weather all strains made poor growth and only one cutting was obtained for forage yield. Strain FC 31843 and FC 23833 gave the highest yield.

Sudan Grass—Three varieties of Sudan grass have been tested for two years. The average green weight yields for the three varieties are as follows: Common, 9 tons per acre; Sweet, 7.9 tons per acre; Tift, 6.1 tons per acre. Pearl millet planted in 1951 gave a higher yield than any of the Sudan varieties.

—H. E. Harris and C. R. Owen



Nursery plots where new pasture plants are tested at the DeRidder Station.

Fertility Studies

Effects of Varying Rates of Nitrate on White Clover-Fescue Grass Mixture

Fertilizers containing uniform amounts of phosphorus and potassium and varying amounts of nitrogen were applied to Bowie fine sandy loam which was planted to a Louisiana white clover-Alta fescue mixture. Phosphorus was applied at the rate of 140 pounds of P_2O_5 and potash at the rate of 60 pounds of K_2O per acre. The soil was limed before seeding as required by soil analy-

sis. The phosphorus and potassium were applied before seeding and the nitrogen was applied as a top-dressing.

The rates of nitrogen ranged from 0 to 132 pounds per acre in 33-pound increments.

From the data obtained the optimum nitrogen application for a good clover-grass mixture appears to be around 66 pounds of nitrogen per acre if the other fertilizer needs have been supplied. Below this amount the clover predominates, which increases the chances of bloat when grazed by livestock, and above this amount the grass tends to crowd out the clover. —*H. E. Harris*

Response of Lespedeza to Minor Elements on Bowie Fine Sandy Loam

This experiment is being conducted to determine the effects of minor elements on plant growth. The source of minor elements being used is a commercial product containing a mixture of the following: manganese sulphate, copper sulphate, ferric sulphate, magnesium sulphate, zinc sulphate, calcium and borax. Lespedeza is being used as an indicator plant to determine the response to additions of Es-min-el to a 3-12-12 fertilizer mixture, a 3-12-12 and lime mixture, and to a 3-12-12 and basic slag mixture. Each treatment is replicated three times.

In this preliminary test there has been little evidence of a response from the use of minor elements.

—*H. E. Harris and M. B. Sturgis*

Grazing Studies

Grazing Habits of Hereford and Aberdeen Angus Cattle on Improved Pastures in West Louisiana

This project was started in an effort to learn more about the grazing habits of beef cattle while grazing improved pastures. The number of hours in a day that cattle should be left on an improved pasture in order to obtain their full grazing needs for maximum gains is not certain.

Data collected on the grazing habits of 10 heifer yearlings, 10 dry cows and 5 cows and calves, covering 117 days of observation, indicate that heifer yearlings that weigh approximately 550 pounds will spend 5 hours a day grazing from 6 A.M. to 6 P.M. when on good, lush, succulent pastures. Dry cows that weighed an average of 900 pounds spent 4 hours and 45 minutes grazing from 6 A.M. to 6 P.M. Mother cows weighing 950 pounds grazed 6 hours of the 12-hour grazing day. Their calves, which averaged 260 pounds, spent 3 hours and 40 minutes a day grazing. The time spent grazing in the mornings and afternoons was about the same. Most of the grazing was done from 6 to 8 A.M. and from 4 to 6 P.M.

The average maximum temperature during the period when the data were being collected was 81° F.; however, the temperature ranged from 67° F. to 95° F. The heifer yearlings grazed an average of 30 minutes a day longer when the temperature ranged from 67° F. to 80° F. than when the temperature ranged from 80° F. to 95° F.

Average daily gains for the heifer yearlings, dry cows, and cows and calves during the trial were 1.77, 3.06, 1.25 and 1.12 pounds, respectively.

Breed differences in respect to grazing habits were not evident.

Performance and Grazing Habits of Hereford and Aberdeen Angus Cattle Grazing Improved Pastures with Natural Shade and Without Shade

This study was initiated in an effort to throw more light on the controversial question of whether shade is beneficial or not beneficial under Louisiana climatic conditions for the Hereford and Aberdeen Angus breeds of cattle while grazing improved pastures.

Data collected beginning April 1, 1951 and continuing through August 1951 indicate that shade may be beneficial when temperatures climb to around 90° F. and higher; however, relative humidity, cloudiness, and wind had a pronounced influence on grazing habits.

Cows and calves, dry cows, and heifer yearlings grazing improved pastures without shade during April and May made good gains and did not apparently suffer in any way from lack of shade. However, with the advent of higher temperatures, these same cattle indicated visibly a need for shade. The cows and heifer yearlings actually panted. They walked up and down the fence



Cows and calves suffering from heat as a result of lack of shade.

lines and piled-up in fence corners seeking meager shade of fence posts and gates. They drank frequently and stood most of the day. Rumination was also greatly reduced. They began lying down after it started cooling off in the late afternoons. In contrast, the cattle grazing the pastures with shade got up, drank, and started grazing approximately the same time the cattle without shade started lying down.

All classes of cattle grazing pastures without shade made somewhat lower average daily gains than cattle grazing the pastures with shade.

Breed differences in relation to heat tolerance were not evident. —*A. H. McDaniel*

A Detailed Comparison of the Hereford and Aberdeen Angus Breeds of Cattle Grazing Improved Pastures

Experiments of this nature are necessarily slow. However, considerable progress has been made in the acquisition of cattle and facilities in the setting-up of a definite breeding program. The study will cover both major and minor phases of producing beef cattle on improved pastures in West Louisiana. Approximately 75 head of mother cows and 25 head of heifer yearlings will comprise the experimental herd each year.

Data collected during 1951 on various production phases follow:

	Hereford Cows	Aberdeen Angus Cows
Score or Grade	80	82
Ave. Weight of Cows	882 lbs.	886 lbs.
Ave. Weight Range - Feb. and July	766-998 lbs.	817-956 lbs.
Ave. Weight Gains on Pasture - Mar. thru Nov.	95 lbs.	56 lbs.
Ave. Weight Loss - Dec. thru Feb.	-94 lbs.	-56 lbs.
Cows Calving	79 %	75 %
Calves Raised	77 %	72 %
Ave. Weaning Weight of Calves at 205 Days	420 lbs.	413 lbs.

—*A. H. McDaniel*

Poultry

In March, 1950, a poultry unit was established. The purpose of this project was to make a comparison of the first and second years' production, cost and profits of a laying flock consisting of approximately 1,000 hens at the beginning of the experiment.

This project is in the second year. The flock has continued to produce eggs valued at more than the cost of feed even during the molting season. A final report will be made on the project at the end of the experiment. —*C. B. Roark*

U. S. Department of Agriculture

Irish Potato Investigations

The Southeastern potato improvement project with headquarters at Baton Rouge is conducted cooperatively by the Agricultural Experiment Stations of Louisiana, Tennessee, Alabama, Mississippi, Georgia, Florida, South Carolina, North Carolina, Texas, and the United States Department of Agriculture.

The primary purpose of this project is to develop high yielding red-skinned potatoes resistant to late blight and scab and well adapted to growing conditions in the South as well as to those in the seed producing areas in the North, but some white-skinned varieties with the same characteristics are developed also. Every effort is made to make crosses between seedlings and varieties having red tubers, and varieties that are resistant to late blight and scab.

The true seed obtained from crosses is planted in flats, and the young seedlings are transplanted to 3-inch pots in the greenhouse provided by the Louisiana Agricultural Experiment Station at Baton Rouge. The seedlings from crosses of which at least one parent is resistant to late blight are placed in large moist chambers and are inoculated with the causal fungus of late blight, *Phytophthora infestans*, to test for resistance. Seedlings from scab-resistant parents are tested in scab-infested soil in a cold frame heated by electric cables. Most of the seedlings found susceptible to late blight and scab are discarded, but tubers from resistant plants are saved to be planted for increase in plots maintained at the Plateau Experiment Station in Crossville, Tennessee.

Tubers from seedling varieties developed at the national potato breeding station at Presque Isle, Maine, which have characters desirable for production in the South are also obtained and grown for increase in Tennessee. Tubers from the best seedlings in the increase plots are sent to the cooperating states where they are tested for adaptability, yield, and quality.

Late blight is a limiting factor in potato production in the South. As a result of the sporadic occurrence of late blight in Louisiana during the last decade, complete failure of the potato crop has often resulted on many farms. Scab occurs in the South and in some areas is of considerable importance, but taken as a whole, it is of minor importance as compared with late blight.

As a result of intensive crossings between blight-resistant

and commercially desirable varieties, over 200 blight-resistant seedling varieties are now being propagated for testing. Most of these produce white-skinned tubers, but each year more blight-resistant seedlings that are red skinned are obtained. In several seedlings late blight and scab resistance are combined. About 100 scab-resistant seedling varieties are being propagated for testing.

A carload of tubers of Kennebec, a recently introduced blight-resistant variety, was divided among 10 different farms and grown commercially in Louisiana during the spring of 1951. Experimental tests of this variety during the last five years in the State have given excellent results as to blight resistance, yield, cooking quality, and tuber shape. When Kennebec was grown commercially last spring, the tubers developed a serious rot unrelated to late blight. Additional tests will be required to determine whether Kennebec, Pungo, Cherokee, and some of the other recently developed blight-resistant varieties can be successfully grown commercially in Louisiana. —*T. Dykstra*

Inversion of Cane Sugar in the Honey Stomach of the Bee

Nectar, as collected by field bees, is believed to be mainly an aqueous solution of fructose, glucose, and sucrose. The following experiments were conducted to determine the changes occurring in the nectar within the honey stomach of the bee while the bee is collecting nectar.

Caged honeybees were fed sugar (sucrose) sirups of known concentrations for limited lengths of time. The contents of the honey stomachs were then removed at intervals and chemical determinations were made of the sugars. It was observed that there was both rapid inversion of the sucrose and dilution of the honey stomach contents. The rate of dilution varied from 13.3 per cent to 58.6 per cent after 2.5 hours when a 50 per cent sirup was fed. Variation in the rate of dilution probably was the result of differences in the ages of the bees and of the rate of activity of the secretory glands.

A sugar sirup of 25 per cent concentration was 55.7 per cent inverted to glucose and fructose after 2.5 hours in the honey stomach; a 50 per cent sirup was 81.4 per cent inverted after 2.5 hours; and a 75 per cent sirup was 56.7 per cent inverted after 3 hours.

A qualitative test for protein gave positive results when applied to the honey stomach contents 2.5 hours after feeding. This

finding substantiates the belief that a glandular secretion, invertase, is added by the bee to the nectar in its stomach.

The principal function of the honey stomach has been generally considered to be only a storage place for nectar. As a result of this experimental work it may be concluded that another important function is the addition of invertase (from the salivary glands) to the nectar. The invertase speeds up the conversion of the nectar sucrose to the invert sugars of honey.

E. Oertel, E. A. Fieger,¹ V. R. Williams,¹ and E. A. Andrews¹

Cotton Disease Investigations

Cotton disease investigations conducted during the past year by the Division of Cotton and Other Fiber Crops and Diseases, United States Department of Agriculture, in cooperation with the Louisiana Agricultural Experiment Station, were continued along the lines previously reported.

The disease projects include breeding for bacterial-blight resistance, breeding and testing for fusarium-wilt resistance, and testing new strains for yield and tolerance to Verticillium wilt.

The regional project on cottonseed treatment for control of seedling diseases and stand improvement was discontinued at the close of the 1950 season. The results obtained for Louisiana and the other nine states included in the study for the years 1938-1948, inclusive, have been published by the Committee on Cotton Seedling Diseases of the Cotton Disease Council. This publication is Technical Bulletin No. 1025, United States Department of Agriculture, issued in December 1950 and entitled "Cottonseed Treatment: Its Effect on Seedling Emergence, Seedling Survival, Plant Stands, and Yields."

Bacterial Blight

Testing for bacterial-blight resistance, *Xanthomonas malvacearum*, is now in an advanced stage and certain lines have been isolated which are *resistant* to this disease. Some are now ready for yield trials and evaluation of other desirable agronomic characters. During the past season progenies of three selections made in 1950 from each of two massed F_2 and F_3 Stoneville 2-B hybrids and progenies of three selections made the same year in the F_2 generation of the second backcross, Stoneville 20 x Deltapine 14, from Texas were *completely resistant* after four separate inoculations. The same was true for the progenies of three selections of the cross, Stoneville 20 x Deltapine 14-312, from Louisiana made also from resistant plants in 1950 following roguing of the susceptible F_2 population. The Louisiana cross, Stoneville 20 x Delta-

¹ Department of Agricultural Chemistry and Biochemistry, Louisiana Agricultural Experiment Station.

pine 14-312, is not only *blight resistant* but, from the behavior in the progeny row, is also productive. Sufficient seed of these blight resistant lines were obtained for field trials in 1952 in the northwestern section of the state, where the disease is most prevalent. —D. C. Neal, F. W. Self, Jack E. Jones, and S. L. Wright

Breeding and Testing for Fusarium Wilt Resistance

In 1951, seventy-seven progeny selections representing 11 selfed strains and 131 progeny selections representing 8 hybrids in the F_7 , F_6 , F_5 , F_4 , and F_3 generations respectively and selected in 1950, were planted in progeny rows in wilt-infested soil. These selections also were artificially inoculated with 10-day-old cultures of the wilt fungus, *F. oxysporum* f. *vasinfectum*, grown on a 3:1 mixture of sterilized oats and wheat at 60 per cent moisture content. Readings to determine the incidence of wilt were made on July 18, August 20, and September 21. Strains showing good wilt resistance were Coker 97, Coquette 17-2-2-3, Delfos 9169, Delfos 425-920, Louisiana 33 and 47, and Stoneville 2-B-R. Among the hybrids, good wilt resistance was shown by strain No. 4 (F_5), a cross between two Coker 100 inbred lines. This hybrid has good yielding possibilities, as indicated by its productiveness in the progeny row, and progenies have been isolated which have satisfactory lint per cent, range 35 to 37, and staple length of $1\frac{1}{16}$, to $1\frac{3}{32}$ inches. Another hybrid which has shown promise in yield tests is Louisiana 33 x Deltapine 14-344. The F_3 generation of this cross has good wilt resistance, as good as the Louisiana 33 parent, productiveness, high lint per cent (40 per cent and above), and staple length of $1\frac{1}{16}$ inches. Other hybrid lines, some of which were tested for yield last season and continue to show good wilt resistance and other desirable agronomic characters, are Deltapine 6 x Delfos 6102 (F_6), Deltapine 6 x Delfos 6102 x Deltapine 6 (F_5), the backcross, and Delfos 9169 x Cook 307-6-4-33 (F_3). —D. C. Neal

Test of New Strains for Tolerance to Verticillium Wilt

In a test conducted in East Carroll Parish in the delta section of the State the past season, some tolerance to *Verticillium* wilt, *Verticillium albo-atrum*, was apparent for certain strains of cotton. The test comprised 12 comparatively new strains and was located on land heavily infested with this wilt. At the end of the season the infection ranged from 46.8 to 92.6 per cent for the different strains. None could be considered resistant to this wilt. However, some were tolerant, that is, despite the wilt the plants made fair yields and were not severely attacked by the disease until late in the season. Among the tolerant lines were Alabama hybrid 257-202 with a yield of 2120 pounds of seed cotton per acre; Empire 861 from Georgia with 2041 pounds; Alabama hy-

brid 81-14 with 1833 pounds; and Louisiana hybrids 37-4, 66-3, and 43-4 with 1770, 1687, and 1687 pounds, respectively. The yield of the strain used as a control, Deltapine 15, was 1503 pounds. Pending the development of *resistant* strains, the use of strains that are tolerant to the disease may be the answer to the Verticillium problem. This disease is considered to be one of the most serious diseases of American Upland cotton and is now known to occur in all of the main Cotton Belt states. —D. C. Neal

Financial Statement

Agricultural Experiment Station
Research Funds

July 1, 1950 - June 30, 1951

FEDERAL RESEARCH FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones	Hope-Flannagan	
					RRF	RM
Appropriation	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$20,050.00	\$85,178.44

EXPENDITURES—FEDERAL FUNDS

Salaries and Wages	13,810.07	12,380.65	48,174.75	48,600.75	16,772.42	65,286.12
Supplies and Expense	597.63	1,713.87	7,259.34	10,782.05	3,460.34	10,832.98
Travel	269.80	408.80	1,909.85	2,572.97	1,059.32	5,730.10
Capital Outlay	322.50	496.68	2,656.06	3,964.19	8,168.32	16,962.38
TOTAL	\$15,000.00	\$15,000.00	\$60,000.00	\$65,919.96	\$29,460.40	\$98,811.58

EXPENDITURES—STATE FUNDS

	Bankhead-Jones State Offset	State Non-Offset	Other State Funds*	Research Fellowship	Total All Funds†
Salaries and Wages	\$53,895.19	\$252,818.18	\$446,134.80	\$24,277.14	\$ 777,125.31
Supplies and Expense	10,260.38	44,132.99	250,749.11	17,881.47	323,023.95
Travel	2,904.07	12,362.01	18,940.32	3,183.79	37,390.19
Capital Outlay	699.46	13,302.22	88,316.03	5,539.63	107,857.34
TOTAL	\$67,759.10	\$322,615.40	\$804,140.26	\$50,882.03	\$1,245,396.79

* Includes appropriations for substations and special Legislative appropriations.

† Does not include funds appropriated for plant expansion.

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DAIRY

- ¹Jennings B. Frye, Jr., Ph.D., Dairy Husbandman; Head of Department of Dairy
- ¹Cecil Branton, Ph.D., Assistant Dairy Husbandman
- ¹Belah J. Burch, Jr., M.S., Assistant Dairy Husbandman
- ¹Alcee J. Gelpi, Jr., M.S., Associate Dairy Technologist
- ¹James Edward Johnston, Ph.D., Assistant Dairy Husbandman
- George D. Miller, M.S., Research Associate in Dairying
- ¹Thomas Everette Patrick, M.S., Assistant Dairy Husbandman
- ¹Louis L. Rusoff, Ph.D., Dairy Nutritionist
- ¹Eric E. West, M.S., Research Associate in Dairying

ENTOMOLOGY

- C. Egan Smith, M.S., Entomologist; Head of Entomology Research Department
- Emile J. Concienne, B.S., Research Associate (located at Centreville, La.)
- Alvan L. Dugas, M.S., Entomologist
- Ernest H. Floyd, M.S., Associate Entomologist
- Lee Dale Newsom, Ph.D., Associate Entomologist
- John S. Roussel, Ph.D., Assistant Entomologist
- James C. Weber, B.S., Research Associate

FERTILIZER AND FEEDSTUFFS LABORATORY

- Ernest A. Epps, Jr., M.S., Chief Chemist; Head of Department
- Hugh C. Austin, Jr., B.S., Research Associate in Chemistry
- Frances L. Bonner, M.S., Assistant Chemist
- Ethel Loyd Claiborne, B.S., Research Associate (resigned Sept. 30, 1950)
- William P. Denson, B.S., Assistant Chemist
- Jesse L. Farr, M.S., Assistant Chemist (retired)
- Joseph George Kowalczyk, B.S., Research Associate in Chemistry
- John B. McDevitt, B.S., Research Associate in Chemistry
- Clayton C. Moreland, B.S., Assistant Chemist
- John W. Torbert, B.S., Research Associate in Chemistry

SCHOOL OF FORESTRY

- ¹Ralph W. Hayes, M.F., Forester; Head of School of Forestry
- ¹Martin B. Applequist, M.F., Assistant Forester
- ¹Bryant A. Bateman, Ph.D., Forester
- ¹A. Bigler Crow, M.F., Assistant Forester
- ¹Leslie L. Glasgow, M.S., Assistant Forester
- ¹Robert W. McDermid, M.F., Associate Forester (appointed Sept. 16, 1951)
- ¹Charles O. Minor, M.F., Assistant Forester
- ¹William M. Palmer, M.F., Associate Forester (resigned Sept. 4, 1951)
- ¹Richard F. West, M.F., Assistant Forester

HOME ECONOMICS

- ¹Clara Tucker, Ph.D., Head of Department of Home Economics
- Kathryn Causey, M.F.S., Assistant Home Economist (appointed July 1, 1951)
- Echo P. Cheely, M.S., Research Associate (resigned Oct. 13, 1951)
- Margaret H. Dallyn, B.S., Research Assistant (resigned Sept. 10, 1951)
- ¹Ray Loree, Ph.D., Associate Home Economist
- ¹Laureame McBryde, B.S., Research Associate
- ¹Dorothy S. Moschette, M.A., Associate Home Economist
- Ruth Martin Patrick, B.S., Research Associate (appointed Sept. 10, 1951)

HORTICULTURE

- ¹Julian C. Miller, Ph.D., Horticulturist; Head of Horticultural Research Department
Rita Belle Attaya, M.S., Research Associate in Horticulture
Stewart Lamonte Dallyn, Ph.D., Associate Horticulturist
James F. Fontenot, M.S., Assistant Horticulturist
²Richard H. Hanchey, M.S., Assistant Horticulturist
P. Lynwood Hawthorne, M.S., Associate Horticulturist
Teme P. Hernandez, Ph.D., Assistant Horticulturist (located at Chase, La.)
Richard W. Jones, M.S., Research Associate (appointed June 15, 1951)
August E. Kehr, Ph.D., Associate Horticulturist
¹William Duke Kimbrough, Ph.D., Horticulturist
John J. Mikell, Ph.D., Associate Horticulturist
John C. Noonan, M.S., Research Associate (resigned Dec. 11, 1951)
²Raymon E. Webb, M.S., Assistant Horticulturist

PLANT PATHOLOGY

- ¹St. John Poindexter Chilton, Ph.D., Plant Pathologist; Head of Department
John G. Atkins, Jr., Ph.D., Assistant Plant Pathologist
¹Arthur R. Colmer, Ph.D., Associate Bacteriologist
Preston H. Dunkleman, M.S., Assistant Plant Pathologist
Claude W. Edgerton, Ph.D., Plant Pathologist (retired)
Irvin L. Forbes, Ph.D., Plant Pathologist; Assistant Director of Experiment Station
Norman L. Horn, Ph.D., Assistant Plant Pathologist (appointed July 1, 1951)
Weston J. Martin, Ph.D., Associate Plant Pathologist
Percy J. Mills, M.S., Assistant Plant Pathologist
¹Antonio G. Plakidas, Ph.D., Plant Pathologist
Ernest R. Stamper, M.S., Assistant Plant Pathologist
Rene J. Steib, Ph.D., Assistant Plant Pathologist (appointed July 1, 1951)
Eugene C. Tims, Ph.D., Associate Plant Pathologist
Edwin H. Todd, M.S.A., Research Associate in Plant Pathology

POULTRY

- ¹Charles W. Upp, Ph.D., Poultry Husbandman; Head of Department
¹William Dewey Blackwell, B.S., Research Associate in Poultry Husbandry
¹Harry E. Hathaway, M.S., Research Associate in Poultry Husbandry
¹Benjamin A. Tower, M.S., Assistant Poultry Husbandman
¹Alva Burl Watts, Ph.D., Assistant Poultry Husbandman
Ernest A. Williams, B.S., Assistant in Poultry Husbandry

RURAL SOCIOLOGY

- ¹Homer L. Hitt, Ph.D., Rural Sociologist; Head of Department
¹Alvin L. Bertrand, Ph.D., Associate Rural Sociologist
¹Paul H. Price, Ph.D., Assistant Rural Sociologist
Irving L. Webber, M.A., Research Associate in Rural Sociology (appointed Sept. 8, 1950; resigned Jan. 31, 1951)

SUGAR STATION

- E. C. Simon, M.S., Agronomist
Claude B. Gouaux, B.S., Agronomist (located at Lafayette, Louisiana)

VETERINARY SCIENCE

- ¹William T. Oglesby, D.V.M., Veterinarian; Head of Department
Alfred Hugh Bjorkgren, B.S., Research Associate in Agronomy (located at Springhill, La.)
- ³Charles H. Bridges, D.V.M., Research Associate in Veterinary Science
Carol Tucker Ernest, M.S., Research Assistant in Veterinary Science (resigned Feb. 28, 1951)
- ¹Robert B. Lank, D.V.M., Associate Veterinarian
Helen Elizabeth Levy, B.S., Research Assistant in Veterinary Science
Roy L. Mayhew, Ph.D., Parasitologist
- ¹James G. Miller, D.V.M., Assistant Veterinarian
Betty Johnson Torbert, B.S., Research Assistant in Veterinary Science (appointed Jan. 3, 1952)

SUBSTATIONS

FRUIT AND TRUCK EXPERIMENT STATION, HAMMOND

Walter F. Wilson, Jr., M.S., Associate Horticulturist; Superintendent
Mike J. Giamalva, M.S., Assistant Horticulturist

NORTH LOUISIANA EXPERIMENT STATION, CALHOUN

Ralph S. Woodward, M.S., Associate Horticulturist; Superintendent
Arthur Varnado Davis, B.S., Research Associate in Animal Industry (appointed Aug. 15, 1951)
James L. Heath, Jr., B.S., Research Associate in Animal Industry
John C. Taylor, M.S., Assistant Horticulturist

NORTH LOUISIANA HILL FARM EXPERIMENT STATION, HOMER

Dawson M. Johns, M.S., Associate Agronomist; Superintendent
LeVernon Beaubouef, M.S., Assistant Agronomist (appointed Feb. 1, 1951; transferred to Southeast La. Dairy & Livestock Experiment Station, July 1, 1951)
Thomas Hansbrough, B.S., Research Associate in Forestry (resigned Sept. 6, 1950)
Fred Hathorn, M.S., Assistant Dairyman (appointed Aug. 15, 1951)
E. E. Hodgkins, B.S., Research Associate in Dairying (appointed February 1, 1951; transferred to Southeast La. Dairy & Livestock Experiment Station, June 18, 1951)
Howard C. Kellgren, B.S., Research Associate in Dairying (appointed Aug. 15, 1950; resigned Jan. 19, 1951)
George E. King, M.S., Research Associate in Marketing (appointed June 11, 1951)
Jack K. Mims, M.S., Assistant Forester (appointed May 28, 1951)
Robert E. Wright, M.S., Assistant Horticulturist

NORTHEAST LOUISIANA EXPERIMENT STATION, ST. JOSEPH

Christopher B. Haddon, B.S., Agronomist; Superintendent
John C. Carpenter, Jr., M.S., Assistant Animal Husbandman
John A. Hendrix, M.S., Assistant Agronomist
Sherman A. Phillips, B.S., Assistant Agronomist
Russel Y. Ratcliff, B.S., Research Associate in Agronomy

PLAQUEMINES PARISH EXPERIMENT STATION, DIAMOND

Ralph T. Brown, M.S., Assistant Horticulturist; Superintendent
Frederick B. Schmitz, M.S., Assistant Horticulturist

RED RIVER VALLEY EXPERIMENT STATION, BOSSIER CITY

Jared Y. Oakes, M.S., Agronomist; Superintendent
Elixis C. Bashaw, B.S., Assistant Agronomist (resigned Jan. 1, 1951)
Cedric R. Jordan, M.S., Assistant Entomologist (resigned Sept. 15, 1950)
Lowell McCormick, B.S., Assistant Agronomist (appointed Feb. 1, 1951)
Earl Bruce Mitchell, M.S., Assistant Entomologist (appointed June 1, 1951)
Weldon A. Nipper, M.S., Assistant Animal Husbandman

RICE EXPERIMENT STATION, CROWLEY

Rufus K. Walker, M.A., Associate Agronomist; Superintendent
David E. Black, B.S., Assistant Agronomist
Charles Nelson Bollich, B.S., Research Associate in Plant Breeding
L. George Coonrod, B.S., Assistant Agricultural Engineer
J. Mitchell Jenkins, B.S., Superintendent (retired)
N. E. Jodon, M.S., Associate Agronomist (U.S.D.A.)
Roy Jean Miears, B.S., Assistant Agronomist
Earl A. Sonnier, B.S., Research Assistant in Agricultural Engineering

SOUTHEAST LOUISIANA DAIRY AND LIVESTOCK EXPERIMENT STATION, FRANKLINTON

H. DeWitt Ellzey, Jr., M.S., Assistant Agronomist; Superintendent
LeVernon Beaubouef, M.S., Assistant Agronomist
E. E. Hodgkins, B.S., Research Associate in Dairying
Billy D. Nelson, B.S., Assistant Dairyman (resigned Jan. 31, 1951)
³ Denis Edward Simon, Jr., B.S., Research Associate in Dairy Husbandry

WEST LOUISIANA EXPERIMENT STATION, DeRIDDER

Cecil B. Roark, M.S., Associate Agronomist; Superintendent
Harold Eugene Harris, B.S., Research Associate in Agronomy
Archie H. McDaniel, M.S., Assistant Animal Husbandman (appointed March 15, 1951)

UNITED STATES DEPARTMENT OF AGRICULTURE

(Located at State Station, Baton Rouge, La.)

K. L. Cockerham, M.S., Entomologist (Bureau "closed out" the work at this Station Oct. 31, 1951)
Theodore P. Dykstra, Ph.D., Senior Pathologist
P. Kips Harrison, M.S., Entomologist (Bureau "closed out" the work at this Station Oct. 31, 1951)
Otto Mackensen, Ph.D., Apiculturist
Troy H. Mullins, M.S., Agricultural Economist
David C. Neal, Ph.D., Senior Pathologist
Everett Oertel, Ph.D., Apiculturist
Irwin L. Saveson, B.S., Drainage Engineer
Hugo Stoneberg, M.S., Associate Agronomist
Stephen Taber, B.S., Apiculturist
Warren Whitcomb, Jr., Ph.D., Apiculturist, in charge
Finis T. Wratten, M.S., Agent (in Agricultural Engineering)

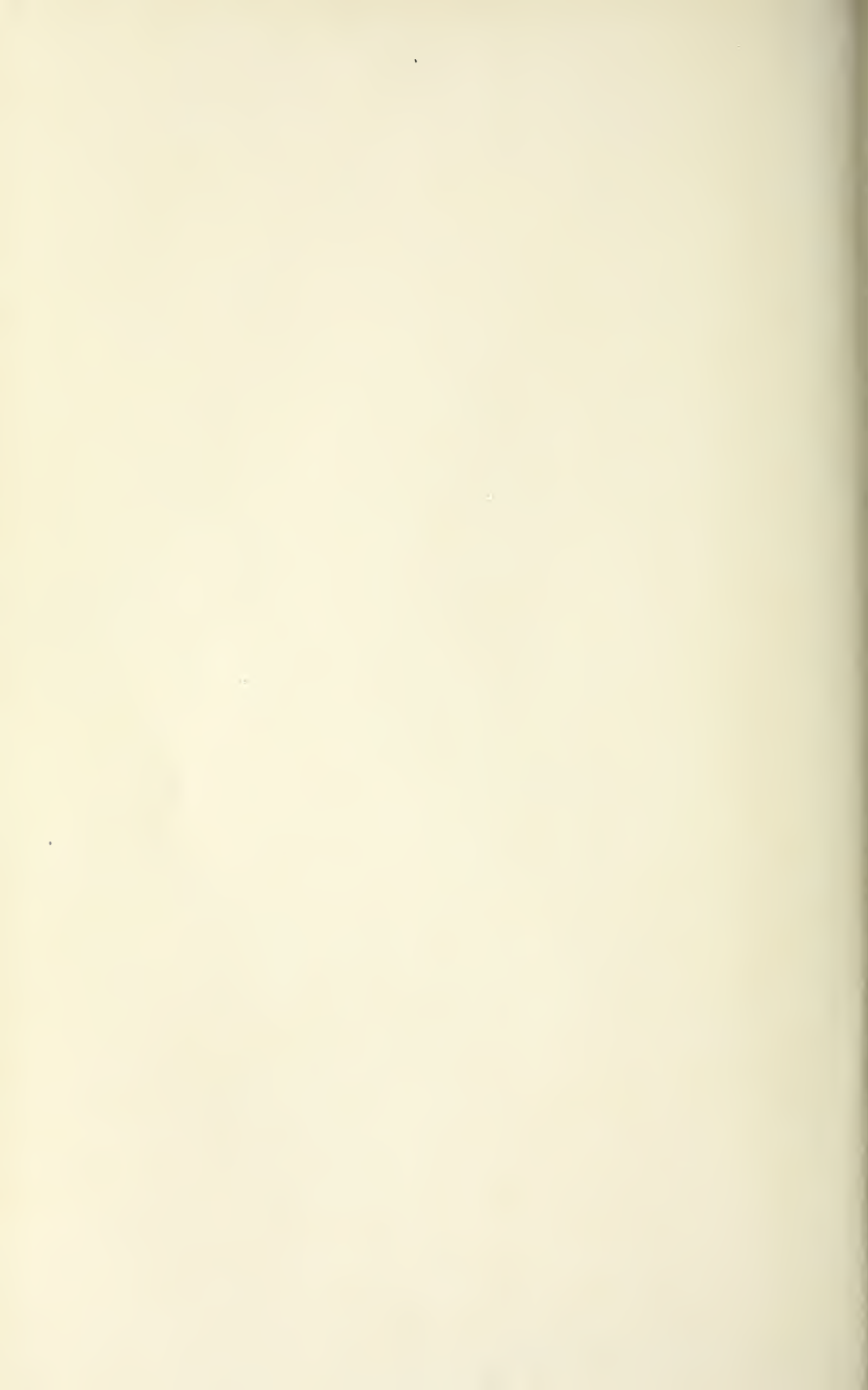
¹ Part-time teaching.

² On leave of absence.

³ On military leave.

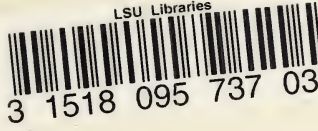
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